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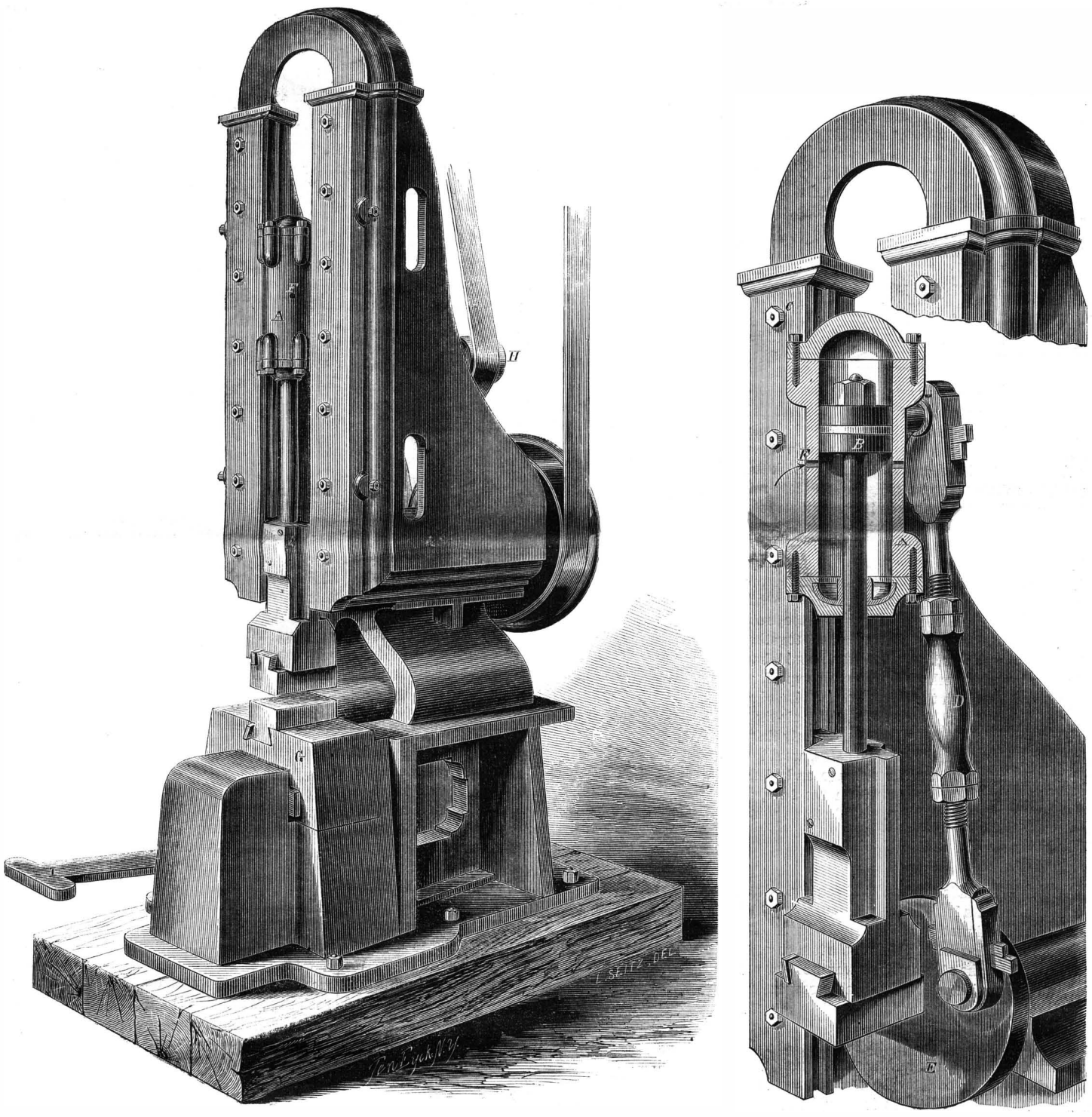

HOTCHKISS'S ATMOSPHERIC FORGE HAMMER.

A great improvement has been made of late years in forging light work. Instead of relying upon the hand and eye of some skillful workman, dies have been substituted, and the jobs thus produced have all the accuracy of castings while they are far superior in strength. Many pieces in gun work, which were iormerly made of malleable iron, from the supposed fmpossibility of forging them, are now drawn out from the solid bar at less cost than they could be cast. Drop-presses have been used on this work, as also rapid-working trip-hammers, but these make such a tremendous racket that it is almost impossible to stay in their vicinity.

The hammer illustrated in this connection is, in many respects, superior to the drop or the trip-hammer, for it is under perfect control, can strike a light or a heavy blow, or any number of blows in quick succession. It can forge or draw down work of any description, and for large or small machine, or jobbing shops is an invaluable aid. On gun work it is also indispensable, and the "Starr Arms Company" are now using one in their extensive manufactory at Yonkers, N. Y. With this testimony in its favor we pass to a brief description of its details and opera. tion.

The hammer derives the force of its blow from compressed air. The air is compressed by a cylinder, A, and piston, B, (see Fig. 2.) The cylinder moves in the slides, C, by the action of the connecting rod, D, driven from the face-plate, E, by belting, in the usual manner. There are two small holes, F, in the cylinder, A. Through these the air enters. The whole machinery is carried in a strong iron frame. Now if we suppose the cylinder to ascend, the air will enter through the holes, F, and be compressed as the cylinder goes up. This compression is at the *bottom* of the cylinder and therefore *lifts* the hammer moving in the slides. By the time the hammer is lifted the connecting rod arrives at the top center and commences

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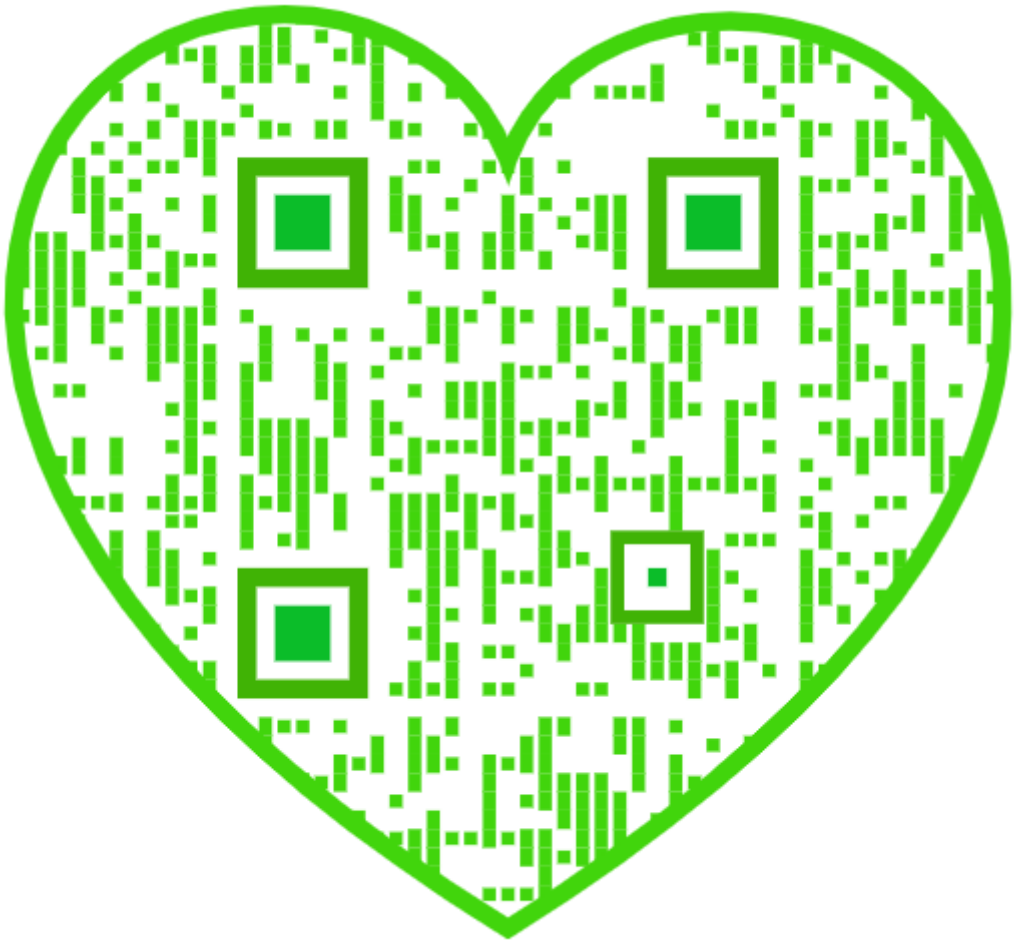

to descend. The air then enters *above* the piston, and as the cylinder still comes down condenses the volume very highly. This condensed air is the force stored up to make the blow, for so soon as the connecting rod turns the bottom center the confined air expands instantly and thus throws the piston and hammer down with great force. This action is repeated at every revolution, and the hight of the cylinder is altered so as to forge large or small work by lengthening or shortening the connecting rod. The hammer is lifted at the ascending stroke by the compressed air below, as we stated previously, and this also aids the cylinder in compressing the air for the return blow, and it is owing to the rapid action of the two movements that the piston does not fall before it obtains the advantage of the air compressed above it.

It will be seen that this hammer is exceedingly simple in its construction; there are no valves about it to get out of order, and the packing is exceedingly durable and easy working. Both that in the piston and in the cylinder head is made of the cup-leathers used in packing hydraulic rams, and they have run for months without leakage or perceptible wear. The dies are fastened in with keys, and the anvil block, G, is adjusted by another key, so that the dies can be set properly without delay. The speed of the hammer is regulated by an idler pulley, H, which can be operated by the treadle, I.

This ingenious and novel hammer is the subject of three patents, bearing date respectively June 14, 1859, July, 1863, and May 3, 1864, which were issued to Bennett Hotchkiss, of New Haven, Conn. For further information address the sole manufacturers, Charles Merrill & Sons, 556 Grand street, New York.

Atmospheric Railways.

Exactly fifty-four years ago, a Mr. Medhurst proposed that a brick tunnel should be built and applied to the conveyance of passengers at speeds never more than dreamt of before. Within the brick tunnel a pair of rails were to be laid, and on these rails a suitable vehicle, very similar in its general arrangements to an ordinary railway carriage, was to travel. The cross section of the brick tube, as proposed, would have been egg-shaped, with the maximum width above. The rails would have rested on projections springing from the side walls near the bottom. To the rear of the carriage a piston, so to speak, formed of boards suitably framed together, would have been affixed. This piston would have nearly fitted the tunnel. Whether any expedients were proposed by which the space between its edges and the brick work could be made partially air-tight, we are not prepared to say. It is not likely that a scheme so perfect in principle as this was, would be found wanting in detail. The carriage and piston thus provided, and put in place within the tube, air was to be forced in behind by means of a large pumping apparatus very similar, we believe, in general design, to the blowing engines at present used at our iron works. The pressure of the air thus pumped in would, it was contended, prove sufficient to propel the carriage with its load of passengers at very high speeds. Mr. Medhurst lived before his time. The scheme never got beyond a model for obvious reasons. In the first place, the steam engine was not yet perfected, and the obtention of the necessary motive power for the blowing machinery was by no means easy. In the second place, people had a very great and perhaps natural antipathy to the idea of being placed within a tube, dark and cheerless, and blown to their destination; and thus a really valuable invention fell to the ground. It is easy, however, to see that Medhurst's was no ordinary mind. In this scheme we have the embodiment of nearly all that constitutes the modern railway—the iron rails, the high speeds, the accommodation for passengers, have a great deal in common with the present system of locomotion, and all this, be it observed, was designed twenty years before the Rainhill trials inaugurated the railway system. After Medhurst came Vallance and Pinkus, gentlemen who proposed certain alterations, the principal idea being involved in the reduction of the size of the tube; the alteration of its position with regard to the carriage, by placing it between the rails and below the floor; and the exhaustion of the air from the space in front of the piston, instead of its compression within the space behind; but this last had already been proposed by Medhurst, who seems to have left scarcely a point overlooked. Messrs. Vallance and Pinkus had no better success than Medhurst, and it remained for Messrs. Clegg and Samuda, years afterwards, to develope the system on a practical scale on the London and Croydon, and Dalkey and Kingstown railways. The atmospheric principle as tried on these lines is now well known to be wholly unsuitable to the demands of an extensive traffic, and, as far as the country is concerned, the vacuum tube and the piston carriage have been banished forever in favor of the locomotive. With the introduction, however, of the underground metropolitan railway system, the old scheme of Medhurst bids fair to be revived. Indeed, there is hardly room to doubt that it is, of all others, the most suitable for the exigencies of this species of traffic. In the pneumatic dispatch we have on a small scale all that Medhurst proposed; and there can be no room to doubt, from the success which has already attended upon the labors of the company known by the same name, that the system can be extended to the conveyance of passengers without any practical difficulty whatever. During the last few months, too, Mr. Rammel, the inventor of the pneumatic dispatch scheme, has been laboring at the Crystal Palace to provide a model line—the first on which regular passengers have been conveyed—which would serve to bring all these advantages fairly before the public.

The tube extends from the Sydenham entrance to the armory near Penge-gate—a distance of about a quarter of a mile, and it is, in fact, a simple brick tunnel, nine feet high and eight feet wide—a size that renders it capable of containing an ordinary Great Western Railway carriage. That actually working in the tube at this moment is handsome and commodious. The piston is rendered partially air-tight by the use of a fringe of bristles extending nearly to the brickwork of the tunnel and its floor. A fan 20 feet in diameter is employed to exhaust or to force in air, and perhaps it is impossible to devise any other expedient so well calculated to answer the required purpose. It must be remembered that either a plenum or a vacuum equivalent to ·5 of an inch of mercury is quite sufficient to propel even a heavy train at a high speed on a moderately level line. In the present instance the motive power is supplied by an old locomotive borrowed from one of the railway companies, which is temporarily mounted on brickwork. The tires have been removed from the driving wheels, and these last put the fan in motion by straps.

The line, we have said, is a quarter of a mile long; a very small portion of it, if any, is level, but it has in it a gradient of one in fifteen—an incline which no engineer would construct on an ordinary railway; and as it is not a level line, so it is not a straight one; for it has curves of only eight chains radius, which are shorter than those usually found in existing railways. The entire distance, 600 yards, is traversed in about 50 seconds, with an atmospheric pressure of but $2\frac{1}{2}$ ounces. The motion is of course easy and pleasant, and the ventilation ample, without being in any way excessive. All the mechanical arrangements are so simple and must be so obvious, we imagine, that it is needless to dwell on them. We feel tolerably certain that the day is not very distant when metropolitan railway traffic can be conducted on this principle with so much success, as far as popular liking goes, that the locomotive will be unknown on underground lines.—*Mechanics' Magazine.*

Small Forge Hammers.

Since the year 1806, when William Deverell, engineer, of Blackfriars-road, specified what was virtually the first crude idea of a hammer to be worked by the direct action of elastic fluids, machinery for forging iron has made vast progress. The steam hammer, under some form, is to be found in nearly every engineering establishment wherein masses of iron of any size, save the very smallest, have to be beaten into shape. The phases under which this machine tool appears, are many and various, and the degree of perfection to which it has been brought is extremely satisfactory. Nevertheless, power hammers do not yet take the place which they ought. This fact is mainly due to a desire to produce machines which can deal with the colossal masses of metal which distinguish the operations of the modern art of working in hot wrought-iron. For centuries past the thews and sinews of the smith have been deemed quite competent to cope with ordinary bars and rods, and plates, to scarf and weld, to cut and punch and shape; and they are deemed so still; but the demand for large forgings, which is quite a thing of yesterday, could not be satisfied by the aid of such means. The old-fashioned helve hammer, although useful enough in its way, is not possessed of that general applicability which is absolutely required. It is probable that the history of this hammer could be easily traced up for a couple of hundred years; yet, until very recently, anchors were forged solely by manual labor, while the furnaces or hearths in which they were heated were blown, not by a fan, but by means of a system of bellows, usually fixed near the roof, and put in action by gangs of men stepping on and off the upper boards, which were raised by a weight and driven down by the men. We hear of such things now with a smile, yet it is by no means certain that succeeding generations may not in turn smile at our proceedings. The toil of the smith is not materially lightened by the steam hammer. That giant has only stepped in so far, to execute a class of work which could not be performed at all without his aid. The working smith, the man who has heretofore beaten out iron into horse-shoes or pruning-hooks, or spades, beats it out still in the old orthodox way, and neither receives, nor expects to receive, any aid from the tool throbbing, perhaps, at his side. In every forge in the kingdom may still be found the smith and his attendant strikers, without whom he cannot get on. Were there no other considerations involved, save those of money, this system would still be found objectionable, because the most costly of all labor is that performed by human muscle and vital energy. It is time that small forge hammers should become so habitual that the duties of the striker might be nearly if not quite dispensed with; but the hammer has yet to be produced which will answer such a purpose, and the sooner it is invented and made, and brought into practical operation, the better for the world and the inventor.

Nothing can be more unsuitable for the execution of work of even moderate dimensons, such as eccentric rods, valve and governor gear, and such like, than a steam hammer capable of doing much heavier work. As a matter of workshop economy, it is always better that tools should be worked nearly or quite up to their full capacity. It is true, however, that a great number of small machines have been brought out from time to time, which are intended to supersede the striker. Ryder's forging machine is one of these, and a very useful and excellent tool it has proved itself for certain classes of work. It is costly in the first instance, however, and it consumes a good deal of power. Compressed air hammers, too, such as Winton and Cowan's, there are in abundance, of small size, and in their way very efficient. Still, none of these things supply exactly the thing wanted; small as they are, they are yet too magnificent for the execution of a great deal of work, too small and unimportant to render their aid indispensable, and yet too large and heavy for one man to perform it unaided. The real want is a steam arm, if we may use the word, which shall do all the hammering comfortably, and which shall be capable of such regulation that it may be said to approach to that discrimination so requisite in a good human striker. It will not do to deliver a series of straight up-and-down blows. The mere weight of the hammer bar must have very little, comparative, to say to the execution of the work, which should be mainly performed by the pressure of steam; and to make such a machine all that it should be, it must be capable of delivering blows at various angles. This might be effected by so fitting the cylinder that it could be swung in a vertical plane through, say 45°, the anvil face marking the center, while the piston rod gave the radius of the curve. By suspending it in blocks moving in curved slots in the frame, such a tool as this, carrying a head of but thirty to fifty pounds weight, with a three or four inch cylinder and an eighteen-inch striker, able to run off three hundred strokes, or thereabouts, per minute, would answer an extremely useful purpose. In order to make it as perfect as possible, however, it is necessary that it should be wholly under the control of the working smith himself. One man should be enough

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to use it to the best purpose of which it was capable; call in the aid of a second, and he might as well be put to strike at once. There is no great difficulty in this; the smith, once he has got his work on the anvil, seldom requires to hold it there with both hands; one therefore being free, the management of the machine by a single lever, would come quite within his powers; a simple treadle too, might lend its aid under peculiar circumstances. From the varying angles at which the blows could be delivered at pleasure, the use of all kinds of dies and swages would become easy, while the most complex small welds could be shut with an ease and certainty unattainable by the use of any hammer striking only straight up-and-down blows.

As to the power to be employed we are disposed to give the preference to steam without hesitation. No hammer can possibly be made to run at high speed by the aid of gravity alone. In order to use compressed air, a piston and cylinder are requisite, and a certain amount of valve gearing is indispensable; and these things being provided once, the piston may just as well be put in motion by steam, as by the aid of belts and gearing. We do not wish to be understood as generally condemning compressed air hammers; on the contrary, we consider them admirably adapted to certain situations, such as forges at a great distance from a boiler; but, as a rule, we prefer steam. It may perhaps be urged that there is no need for such little hammers as we have just spoken of—that the work which they would perform is too insignificant to require the aid of machinery; but this is not true. It is in the performance of some of the most apparently trivial operations that the aid of machinery has been called in with the greatest advantage; and while hundreds, nay thousands of tuns of small forgings have to be made annually, there will always be a field open for the introduction of the proper modification of the steam hammer to make them.—*Mechanics Magazine.*

DIE ENGRAVING, SINKING AND MULTIPLYING.

BY J. NEWTON, OF THE ROYAL MINT.

It is more than probable that, with the exception of those who may be practically engaged in the above-named arts, very few persons are acquainted with the modern method of preparing dies, whether for the stamping of coins or the striking of medals. The general belief shared, as we have reason to know, by many scientific men, is, that each individual die used for either of these purposes must first be engraved by the skillful hand of an artist, and that therefore, at her Majesty's Mint, where, in addition to the coins of the realm, all our naval and military medals are struck, a numerous staff of engravers is constantly employed in the preparation of new dies. This is a very reasonable supposition ; but as it is also a very erroneous one, it is intended to explain in as popular a way as the subject will admit, the system of die manufacturing as actually carried on at that establishment. It will be found that the processes employed in the conversion of bars of steel as they come from the molds and mills of Sheffield into coining and metal dies are to the full as interesting as those exercised in any other branch of manufacturing and industrial art.

The melting of wrought or bar steel, intended for conversion into cast-steel, is effected in small crucibles formed of clay and plumbago, and which are capable of holding about 30 lbs. weight each of the metal to be acted upon. Ten or twelve of these are placed in furnaces very similar to those used in ordinary brass foundries. After the crucibles have been brought by the concentrated action of a coke fire to a white heat, they are charged with pieces of bar steel reduced to a particular degree of softness, and weigh about a pound each. When the crucibles are thus loaded, lids of clay are placed ov them, the furnaces are filled with coke, and the covers of the furnaces are put down. The intense heat thus generated soon reduces the contents of the crucibles to a liquid state, and induces an ebullition of the metal, resembling somewhat the boiling process in the case of ordinary fluids. When the furnaces require feeding with fresh coke, the lids of the crucibles are also removed, and the workmen are enabled to judge as to how far the process is matured. Usually in about three hours the molten metal is ready for "teeming." The subsidence of the ebullition, and the dazzling brilliancy of the metal are proofs of the successful completion of the fiery ordeal, and it is then forthwith poured into ingot molds of the shape and size required. When cold, the resulting ingots are removed, and are in fit condition for the market and the rolling mills or the workshop. Those which are intended for conversion into dies are first elongated into bars, of which we shall have to speak hereafter. Without further preface let us now proceed to deal with the manufacture of cast-steel dies as practiced at her Majesty's Mint. The whole of those which are used there—and in these days of incessant money-making their name is "legion"—are produced within its own walls.

Rectangular bars of the finest cast-steel which Sheffield can furnish, and varying in size in accordance with the respective denominations of coin in the British series alone are used in the Mint. There are two substantial reasons for employing highly refined steel in die making. The first is that the elaborate engraving and fine lines of the artist, as placed on an original die, may be satisfactorily copied, and the second that due resistance may be gained by the perfect homogeneity and toughness of the metal to the rapidly-repeated and heavy thuds of the coining presses. Constant practice has made the officers and workmen of the department excellent judges of the peculiar mechanical and chemical properties which should distinguish the steel they use. They are consequently not very liable to error in selecting it. It is not essential, perhaps, to explain minutely the peculiarities which distinguish good die steel; but it may be said that that which exhibits, when broken or fractured, a moderately fine grain which is of uniform texture, and when polished is free from spot or blemish is the best. Let it be imagined for illustration, that a coinage of florins is required to be struck and issued from the mint, and that the entire duty of engraving, sinking and multiplying a number of dies for the purpose has to be performed. Then, if we succeed in making the operation understood, our readers will have obtained information as to the manufacture of dies generally, for all pass through similar processes. The engraver will have received his instructions from the master of the mint. Let us therefore visit his *atelier* and watch his movements. Having selected with especial care the bar to be first used, tested portions of it with rigorous severity, and thus assured himself of its perfect fitness, the artist will cause it to be sent to the mint. After one end of the bar is heated to redness in an ordinary forge, two pieces are cut off it of the size required. The resulting blocks are then again heated and swaged into round form. It may be suggested that the bars of cast-steel might as well be made round before reaching the hands of the die forgers, and that this would save the labor of hammering the blocks into round shape afterwards. The smith's labor, however, is not labor lost, for it gives a density and tensile strength to the embryo dies which they would not otherwise possess, and hence they are eventually found more durable. It will be well to explain, too, that the blocks are not rounded longitudinally with the bar from which they are cut, but transversely; that is to say, the sides of the bar form the tops and bottoms of the dies, The grain of the steel is thus made to pass across the dies, and not vertically through them. They are thus rendered less liable to splitting while under the press.

The two rounded blocks are next annealed to the fullest extent possible, and this is done by placing them in a wrought-iron pot, covering them with animal charcoal and depositing the whole for twenty-four hours in an oven heated by coke; they are afterwards withdrawn, removed from the pot, and allowed to cool gradually. Next they are taken to the lathe and one end of each is turned. That which is intended to become the "matrix" die (of which more anon) is made perfectly flat and smooth, and it is upon this prepared surface that the artists' talent will have to be first expended. The second block, turned slightly conical, and which is destined to become the "puncheon" may be put out of view *pro tem.* The engraver addresses himself to the work of etching in upon the matrix block his approved design, say of the obverse for the florin. Assured of having put in his outlines correctly, the work of engraving fairly commences, and only those who have witnessed the operation of die cutting can realize the amount of patience and skill necessary for its successful completion. After many weeks of close and constant application the design in intaglio will probably be finished, repeated impressions in clay and soft metal being taken *ad interim* by the artist as tests of the accuracy of his work. Innumerable touchings and re-touchings, with the graver, are indispensable to the minute realization of the design, but it at last satisfactorily appears on the surface of the softened steel. The letters to form the legend and the date are stamped in by aid of punches, and the matrix or first die is engraven. A very important and, to the engraver, an anxious operation follows. It is that of hardening the matrix. In its present annealed condition it is practically useless, and therefore the risk must be run of exposing a very beautiful work of art in quick succession to the tender mercies of the antagonistic elements fire and water. There is no escaping this, however; and the artist, if a nervous man, may tremble for the result. His only hope lies in the excessive care with which the work is done, and the excellence of the cast-steel of which the die is composed. The preservation unmarred of the delicate lines and tracery which have cost him so many hours and so much exertion is naturally a great consideration. To insure this, as far as possible, the engraved face of the die is covered by a mask composed of some fixed oil, thickened to the consistency of a paste by the addition of animal charcoal finely powdered. This Ethiopian-like compound is spread over the surface of the engraving to which it closely adheres, filling all interstices.

As an extra precaution an iron ring is usually made to encompass tightly the matrix before hardening, so as to lessen the risk of fracture. In this condition it is deposited with its face downwards in a pot or crucible and buried once more in animal charcoal, that is to say burnt leather, horn, etc. The crucible and its precious contents are placed now in a furnace, the whole being heated to redness. After submission to this saturation of fire, if the term be admissible, for about an hour the pot is withdrawn and the matrix, taken out of it by means of a pair of tongs, is instantly and *sans ceremonie* plunged into a cold-water bath. The bath is sufficiently capacious to contain as much water as will prevent the latter becoming sensibly warm by the immersion of the red-hot die. Held firmly by the workman's tongs, the matrix is swayed too and fro rapidly in the water until it ceases to splutter and hiss at its rough treatment. Should no unusual or singing sound proceed from it while in the bath, the probability is that the expansion induced by the fire and the sudden contraction caused by the cold water have not injured the die, and the engraver may take heart again, for his work is safe and sound. If, on the contrary, it sings the die will be found to have cracked in the process of hardening and his work will have to be done over again. For the reasons previously given such a disastrous result seldom happens at the Royal Mint.

Allowing that all has proved favorable, the coating which protects the engraved surface is removed, and the matrix is forwarded to the polisher, who, by pressing its "table" or face carefully against a flat disk of iron running rapidly in a lathe, and upon which a film of flower emery and oil has been spread, soon produces a mirror-like polish. Tempering is the next operation, for at present the steel is much too hard for its purpose, and this is effected by putting the matrix into water to be gradually heated to the boiling point or by placing it on a red-hot plate of iron. In either case the work is done when the die, after a series of chameleon-like changes of color, assumes that of pale straw. At this juncture, therefore, it is again plunged into cold water, and the obverse matrix is ready for use. Arrangements of a precisely similar character throughout are observed in the production of the reverse matrix, and thus the first and more important stage in the manufacture of coining dies is passed.

It is time that we turned to the second block of steel, namely, that intended for the "puncheon." This has been annealed and turned, not flat, but flatly conical, on the surface to be decorated. Both it and the matrix are thus made ready for a massive and powerful stamping press, with a coarse triple-threaded screw of some 6 inches in diameter passed

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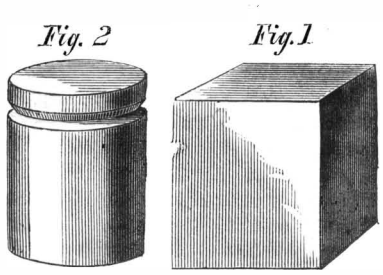
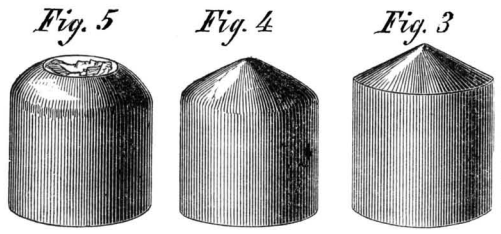
vertically through its center attached to the upper part of the screw, and above the press are two heavily weighted fly-arms which constantly tend to force down the screw. To the lower end of the screw, and with its face downwards, the matrix is firmly fixed by a workman, who stands in the recess sunk in the floor to the depth convenient for bringing his eyes and his hands to a level with the bed of the press. The puncheon block is deposited next it with its face turned upwards on the solid cast-iron bed of the press, and immediately and fairly below the matrix. All being ready, several strong-armed workmen seize the fly-arms and walking round with them raise the screw and matrix until the latter is several inches above the puncheon block. On a sudden they release their hold, and the weighted arms revolving with a speed and force which would be fatal to any person standing in their way, drive down the matrix until it impinges with a dull, heavy thud upon the puncheon block. Again the workmen stand to their fly-arms and raise the screw of the press. The effect of the blow is then seen in the depressed apex of the cone-topped die which received its impact, and in the transference to itself thereby of a partial copy in relief of the intaglio-engraved matrix. The compression of the particles of steel composing the puncheon by the stress of the blow, mechanically hardens the puncheon, and before its impression can be completed by a repetition of the act, it must be again annealed. This is effected in the same way as before, the puncheon is returned to the press, and the matrix, now detached from the screw, is placed loosely on the top of it, though, for an obvious reason, in such a way as that the engraving on the matrix and the partly finished impression on the puncheon shall exactly match or fit each other. A blank block of steel is then affixed firmly by aid of set screws to the place before tenanted by the matrix, and may be said to represent a hammer, for it will presently descend with great force upon the matrix. The fly-arms are turned backward by the workmen, the press screw is raised, the arms released, and, gathering momentum as they revolve, the hammer block is made to fall heavily on the matrix. The effect of the seeond blow will, perhaps, be to make the transfer of the engravings as complete on the puncheon as is that of a seal pressed by the hand upon molten sealing-wax, or it may be, if the steel is very obstinate, that another annealing and another blow may be required to effect that object eventually, at least the puncheon will be found upon examination to have imbibed an exact and faithful copy in relief of the engraver's work on the matrix to the finest line and most minute point of detail. The duty of this latter is now done, at all events for the present, and it is placed in the engraver's closet. Far otherwise is it with the puncheon, for its mission is about to commence. It is therefore hardened and tempered, polished it cannot be, on account of its raised surface, and then returned to the press. Such are the processes pursued in the making of matrices and puncheons in reference both to coining and medal-striking for obverse and reverse, although, from the bold impressions usual on medals, many more annealings and strikings of the puncheons are necessary than of those used for coin. Confining our attention for the sake of brevity to the florin, let it now be presumed that puncheons for its obverse and re-



verse have been successfully prepared, it remains to be shown how they are put into useful requisition, and how they are made the parents of rapidly-multiplying families of coining dies, Florin bars of cast-steel are about 10 feet long, $1\frac{3}{4}$ inches broad and $1\frac{1}{4}$ inches thick; upon these the mint blacksmith is the first operator. One at a time they are conveyed to the forge, and cut, while hot, into short pieces of $1\frac{3}{8}$ inches in length, and in this form, therefore, resemble Fig. 1. These square or rectangular blocks he next proceeds to hammer into a cylindrical form, as shown in Fig. 2. He then cuts off in a slanting direction one end of each of the die blocks, and shapes them, by way of preparation, for the lathe, and thus they take the appearance depicted in Fig. 3. Thus he



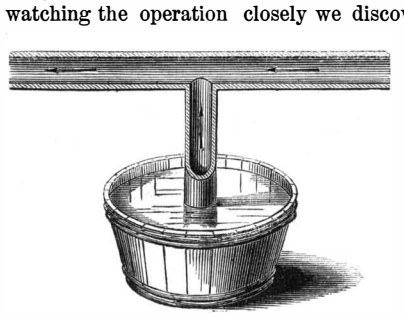
proceeds with die block after die block until he has accumulated a large quantity and diminished materially the length of the bar off which they have been cut. Owing to the severe hammering to which they have been subjected, they are at this stage very hard, and it becomes necessary to anneal them. This is effected by burying them in iron pots containing animal charcoal, and submitting the whole for many hours to the heat of coke furnaces. Subsequently, the blocks are allowed to cool gradually among the ashes and cinders of the furnaces, and are then ready for the turning-room and the lathe; here they are topped, as it is termed—that is to say the conical end of each is turned bright and prepared for its impression. After this operation they assume the appearance indicated by Fig. 4, and are removed to the die multiplying press, which is similar in form and arrangement to that already described.

[To be continued.]

OIL ENTERING A STEAM CYLINDER AGAINST PRESSURE.

In the Detroit Locomotive Works there was at one time a vertical high pressure steam engine (since altered to low pressure) which had an oil cup on the cylinder head. By opening this cup, during either the up stroke or down stroke of the piston, oil would flow in, although the steam gage indicated some 18 or 20 pounds pressure. This was somewhat remarkable. Oil would naturally flow in on the up stroke of the piston, because the exhaust would then be open, and the pressure less than that of the atmosphere; but how was it that steam did not blow out on the down stroke instead of the oil running into the cylinder?

By watching the operation closely we discovered



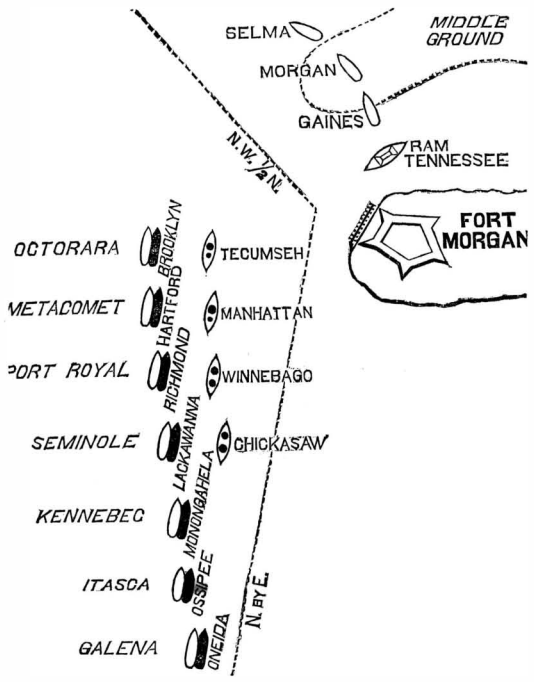
that the oil was drawn in during the first portion only of the stroke, that when the stroke was nearly completed the action was reversed and the oil was blown outward. Seeking for an explanation for this singular circumstance, we observed that the pipe from the oil cup entered the cylinder through the head, and directly over the steam port. We suppose that the oil was drawn in by the friction of the steam in its passage through the port.

A simple case of this kind of action is illustrated in the annexed cut. The two pipes communicate with each other, and the lower end of the vertical one is placed in a tub of water. Now, if a current of water, steam, or other fluid is forced rapidly through the horizontal pipe, it will carry along by friction the upper particles of any fluid filling the vertical pipe. The pressure of the air will force up other portions of the fluid in the vertical pipe to take the place of those removed, and these will in their turn be carried along. Thus an upward current will be created in the vertical tube. Steam pumps have been constructed on this principle. We suppose that this was the action in the case of the oil cup at Detroit.

An account of some experiments made in Newark by a practical engineer, were published in the *American Engineer*, a short-lived mechanical journal, printed in this city a few years ago. These experiments consisted in attaching a steam gage to the steam port, between the cylinder head and the slide valve. When the engine was at work taking steam the gage did not indicate any pressure, showing that the current passed by it entirely, the same as in the case of the oil cup. This case shows the importance of placing indicators in a position not to be influenced by the currents of steam, as they enter or leave the cylinder.

COMMODORE FARRAGUT'S REPORT OF THE ACTION IN MOBILE BAY.

From the report of the brave and skillful Commodore Farragut to the Secretary of the Navy (as published in the *Army and Navy Journal*), we extract a few paragraphs. We are also indebted to the same journal for the diagram which shows the second order of sailing of the fleet :—



"Having passed the forts and dispersed the enemy's gunboats, I had ordered most of the vessels to anchor, when I perceived the ram *Tennessee* standing up for this ship; this was at 45 minutes past 8. I was not long in comprehending his intentions to be the destruction of the flagship. The monitors and such of the wooden vessels as I thought best adapted for the purpose, were immediately ordered to attack the ram, not only with their guns but bows on at full speed. And then began one of the fiercest naval combats on record. The *Monongahela*, Commander Strong, was the first vessel that struck her, and in doing so carried away his own iron prow, together with the cut-water, without apparently doing his adversary much injury. The *Lackawanna*, Captain Marchand, was the next vessel to strike her, which she did at full speed, but though her stem was cut and crushed to the plank ends for the distance of three feet above the water's edge to five feet below, the only perceptible effect on the ram was to give her a heavy lift. The *Hartford* was the third vessel which struck her, but as the *Tennessee* quickly shifted her helm, the blow was a glancing one, and as she rasped along our side we poured our whole port broadside of 9-inch solid shot within ten feet of her casemate. The monitors worked slowly, but delivered their fire as opportunity offered. The *Chickasaw* succeeded in getting under her stern, and a 15-inch shot from the *Manhattan* broke through her iron plating and heavy wooden backing, though the missile itself did not enter the vessel.

"Immediately after the collision with the flagship, I directed Captain Drayton to bear down for the ram again. He was doing so at full speed when, unfortunately, the *Lackawanna* ran into the *Hartford* just forward of the mizzenmast, cutting her down to within two feet of the water's edge. We soon got clear again, however, and were fast approaching our adversary when she struck her colors and ran up the white flag. She was at this time sore beset: the *Chickasaw* was pounding away at her stern, the *Ossi-*

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pee was approaching her at full speed, and the *Monongahela, Lackawanna*, and this ship were bearing down upon her, determined upon her destruction. Her smoke-stack had been shot away, her steering chains were gone, compelling a resort to her relieving tackles, and several of the port-shutters were jammed. Indeed, from the time the *Hartford* struck her until her surrender, she never fired a gun. As the *Ossipee*, Commander Le Roy, was about to strike her, she hoisted the white flag, and that vessel immediately stopped her engines, though not in time to avoid a glancing blow. During the contest with the rebel gunboats and the ram *Tennessee*, and which terminated by her surrender at ten o'clock, we lost many more men than from the fire of the batteries of Fort Morgan. Admiral Buchanan was wounded in the leg, two or three of his men were killed, and five or six wounded. Commander Johnston, formerly of the U. S. Navy, was in command of the *Tennessee*, and came on board the flagship to surrender his sword and that of Admiral Buchanan. The surgeon, Dr. Conrad, came with him, stated the condition of the Admiral, and wished to know what was to be done with him. Fleet-surgeon Palmer, who was on board the *Hartford* during the action, commiserating the sufferings of the wounded, suggested that those of both sides be sent to Pensacola, where they would be properly cared for. I therefore addressed a note to Brigadier General B. L. Page, commanding Fort Morgan, informing him that Admiral Buchanan and others of the *Tennessee* had been wounded, and desiring to know whether he would permit one of our vessels under a flag of truce to convey them with or without our wounded to Pensacola, on the understanding that the vessel should take out none but the wounded, and bring nothing back that she did not take out. This was acceded to by General Page, and the *Metacomet* proceeded on this mission of humanity.

"In this connection I must not omit to call the attention of the Department to the conduct of Acting Ensign Henry C. Nields, of the *Metacomet*, who had charge of the boat sent from that vessel when the *Tecumseh* sunk. He took her in under one of the most galling fires I ever saw, and succeeded in rescuing from death ten of her crew within 600 yards of the fort. I would respectfully recommend his advancement. The commanding officers of all the vessels who took part in the action, deserve my warmest commendations, not only for the untiring zeal with which they had prepared their ships for the contest, but for their skill and daring in carrying out my orders during the engagement. With the exception of the momentary arrest of the fleet when the *Hartford* passed ahead, and to which I have already adverted, the order of battle was preserved, and the ships followed each other in close order past the batteries of Fort Morgan, and in comparative safety, too, with the exception of the *Oneida*. Her boilers were penetrated by a shot from the fort which completely disabled her, but her consort, the *Galena*, firmly fastened to her side, brought her safely through, showing clearly the wisdom of the precaution of carrying the vessels in two abreast. Commander Mullany, who had solicited eagerly to take part in the action, was severely wounded, losing his left arm. In the encounter with the ram, the commanding officers obeyed with alacrity the order to run her down, and without hesitation exposed their ships to destruction to destroy the enemy. Our iron-clads. from their slow speed and bad steering, had some difficulty in getting into and maintaining their position in line as we passed the fort, and in the subsequent encounter with the *Tennessee*, from the same causes, were not effective as could have been desired; but I cannot give too much praise to Lieutenant Commander Perkins, who, though he had orders from the Department to return North, volunteered to take command of the *Chickasaw*, and did his duty nobly.

"The *Winnebago* was commanded by Commander T. H. Stevens, who volunteered for that position. His vessel steers very badly, and neither of his turrets will work, which compelled him to turn his vessel every time to get a shot, so that he could not fire very often, but he did the best under the circumstances.

"The *Manhattan* appeared to work well, though she moved slowly. Commander Nicholson delivered his fire deliberately, and, as before stated, with one of his 15-inch shot broke through the armor of the *Tennessee*, with its wooden backing, though the shot itself did not enter the vessel. No other shot broke through her armor, though many of her plates were started, and several of her port-shutters jammed by the fire from the different ships."

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Association held its regular weekly meeting at its room at the Cooper Institute, on Thursday evening, Sept. 15th. From the proceedings we select a few items:—

NOVEL APPARATUS FOR RAISING PETROLEUM.

Dr. Rowell exhibited a glass model designed to illustrate the action of an apparatus previously mentioned by Mr. Overton as having been recently introduced in the oil region for raising petroleum. By the present mode, after a hole some four or five inches in diameter is bored through the earth down to the oil, a pipe is introduced with a pump near the bottom, and the oil is thus pumped out. In some cases the pressure of gas upon the surface of the liquid forces the oil nearly up to the surface, and it is in these cases that the new apparatus is employed. A second pipe is introduced into the hole with its lower end bent upward so as to enter tho lower end of the first pipe. Air is then forced by an air pump down through the second pipe into the lower end of the first pipe, and as the bubbles rise along this pipe they so reduce the weight of the liquid column that the pressure of the gas raises it to the surface, and thus a constant flow is secured. Dr. Rowell's apparatus consisted of two glass tubes immersed part of their length in water, with the lower end of one tube bent up and entering the lower end of the other. On blowing into the bent tube, the weight of the aqueous column in the other tube was so reduced by the bubbles of air that the pressure of the water outside of the tube forced the water within the tube to the top, and it overflowed.

The President remarked that this plan would require a larger expenditure of power than the pump, as the friction of an air pump is very great.

Dr. Rowell suggested as a counterbalancing consideration, that with the pump, motion must be imparted at every stroke, not only to the long line of pump-rods, but also to the whole liquid column, while with this air pump arrangement the flow of oil would be constant. There would, therefore, be less expenditure of power in overcoming inertia.

PETROLEUM FOR CURRYING LEATHER.

Mr. Page stated that the leather of which his boots were made was curried with petroleum in place of the fish-oil usually employed, and that, though a year old, it had shown no signs of cracking. He observed that many leather dealers thought petroleum made the leather tougher than fish-oil.

COST OF REFINING PETROLEUM.

Mr. Page, in reply to a question, said that the average cost of refining petroleum is about five cents per gallon, besides the loss or shrinkage, and that this ranges from 10 to 40 per cent.

PETROLEUM CANDLES.

Mr. Page remarked that he had compared the candles made of Marietta parafine with the best sperm candles, and their superiority was very marked. They are just about as hard as lead, and remain perfectly solid and dry in the hottest climates.

The Preservation of Fruit was selected as the subject for the next evening.

THE ONE THOUSAND-POUNDER CANNON.

On page 282, Vol VI. (new series) of the SCIENTIFIC AMERICAN, was published the following report made to the War Department by Capt. Rodman, on the 17th of April, 1861:—

"The entire success which has attended the manufacture and trial of the 15-inch gun, leaves no doubt of our ability to make reliable guns of even greater diameter of bore than 20 inches, and to maneuver and load with facility, and without the use of machinery, guns of that caliber. A 20-inch gun, one caliber thick, 210-inch length of bore, and 20 feet total length, would weigh about 100,000 lbs. A solid sphere of iron, 20 inches diameter, would weigh about 1,000 lbs. A shell, 20 inches exterior diameter, 6-66 inches thick, would weigh about 985 lbs. The ordinary service shell need not be over 3.5 inches thick; would weigh about 725 lbs., and contain about 38 lbs. of powder, making the total weight of the loaded shell about 763 lbs. Shells only 3 inches thick may be fired without danger of breaking in the gun; they would weigh about 657 lbs. each, and contain about 48 lbs. of powder, giving the weight of the loaded shell about 705 lbs. Adopting the same method of loading as for the 15-inch gun, nine men, four at each end of the handspike, would load this gun with nearly the same facility that five did the 15-inch gun; and seven men could load it. The charge of powder to impart the ordinary velocity to one of these shells, would be about 100 lbs. The living force of the service shell would equal that of six 10 inch solid shot, and that of the battering shell would considerably exceed that of seven 10-inch solid shot; and the destructive effect of such shells, compared with 10-inch shot, upon iron-clad ships and floating batteries, would be in a much higher ratio; their whole crushing force being brought to bear upon a single point at the same time, while that of the smaller shot would be unavoidably dispersed, as regards both time and point of impact. While, therefore, fully recognizing the principle that the destructive effects of projectiles upon a strongly resisting object, increases in a higher ratio than as their calibers, and having no doubt that reliable guns of larger caliber may be readily made, yet, from the fact that 20 inches is about the largest caliber that can be readily loaded and maneuvered, without resort to machinery, and because it is not deemed probable that any naval structure, proof against that caliber, will soon if ever be built, I propose 20 inches as the caliber next to be tested."

This idea, so clearly formed in all its details in the mind of the ordnance officer three years ago, is now embodied in solid metal. The first 20-inch gun, the largest piece of practical artillery ever constructed, is lying on the wharf at Fort Hamilton, eight miles below this city. The muzzle is marked "20-inch No. 1, Fort Pitt, 1864, 116,497 pounds." The gun was cast at the Fort Pitt Foundry, Pittsburgh, Pa., on the 11th of February, 1864, under the superintendence of R. Aulick, U.S.N., and his official report of the operation was published, with an illustration of one of the furnaces, on page 182, Vol. X., SCIENTIFIC AMERICAN. The dimensions of this monster cannon are, total length, 20 feet 3⅓ inches; length of bore, 17 feet 6 inches, greatest diameter, 5 feet 4 inches; least diameter, 2 feet 10 inches. The chamber is simply a hemispherical finish of the bottom of the bore, as we ascertained by going inside and examining it.

NEW BOOKS AND PUBLICATIONS.

THE MARINE STEAM ENGINE. Main and Brown. H. C. Baird, 406 Walnut street, Philadelphia, Publisher.

Very many persons write to us weekly asking information on the subject of the Marine Steam Engine, and where they can find a work treating upon it in detail. To such persons we recommend this work, for it contains accurate descriptions of the marine engine in its various forms; both vertical, horizontal, and inclined. The subject of valve gearing and valves, especially the English D-valve, long and short, is treated of in a lucid and interesting style. In addition to the illustrations, there is a large amount of technical matter referring to the management of engines, when disabled or under peculiar circumstances, as for instance, "how to ascertain if the piston be tight," "danger from impure air in boilers," "to get a cylinder cover into its place," "piston loose on the rod," "on stopping cracks in boilers," and other subjects of a similar character. From this the engineer or student will see that the work is a valuable one, and any one at all connected with or interested in the steam engine should possess a copy.

WEBSTER'S UNABRIDGED.—Messrs. G. & C. Merriam, Publishers of Webster's Dictionary, have recently issued a new edition of the Unabridged, which renders the Lexicon more valuable than ever. The enterprising Publishers seem determined that no work shall excel theirs, and thus by additions constantly being made in their new editions they keep Webster the acknowledged standard.

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Correspondence

Further Improvements in Stoves Demanded.

MESSRS. EDITORS:—In consequence of a call made some weeks ago in your valuable journal for some mode of raising the bottom grate of a cook stove, so as to require less coal for summer use, a device has been invented which I understand meets the requirement. Now my wife says that "she wishes somebody would invent some improvement in the grates of cook stoves whereby the cook could at any time remove the stones and clinkers from the bottom of the fire, without dumping or letting down the whole and consequently putting the fire out." Our cook stove has a draw-bar in the middle to let out the fire for cleaning the grate, but we want something that will allow the grate to be cleaned of stones, etc., without letting out the fire. If you will make a call in your journal for such an invention I have no doubt the thing will be produced, and a great benefit rendered to those who use cook stoves.

JOHN FRUIT.

Camden, N. J., Sept. 12, 1864.

One of a Thousand.

MESSRS. MUNN & Co.:—You have already obtained two patents for me, and I have been so well pleased with the promptness and dispatch with which my business has, in each instance, been attended to, that I must solicit your services in another case of the same kind. You will please find enclosed a draft on New York for the first installment of Patent Office fee, etc.

WILLIAM NASH.

[The writer of the above not only knows the best place to have his patent business attended to, but he is a good inventor. The implement, which he refers to as having been sent with his letter, is the very best for the purpose we have ever seen.—EDS.

A Mechanic's Opinion of the "Scientific American."

Mr. O. Dunham, of West Paris, Maine, writes us as follows:—"I enclose $1 for the SCIENTIFIC AMERICAN. I am in the country for a short time, but I cannot do without my favorite paper, it furnishes so much food for the mechanical mind. I cannot for my life comprehend the reason why every mechanic in the country does not take it; for myself I can say I should take it were the price doubled."

A Strange Love--Fond of Emetics!

Louis, the greatest of living French medical authors, states that persons sometimes die of consumption without any cough, until within a week or two of death; while bronchitis, which leads to consumption, never can exist without a violent cough coming on any hour of the day or night, yielding an expectoration various in color, quantity, and consistency; and is always attended with "tightness," or other discomfort in breathing; the general health otherwise seeming to be good. Dr. Hall, the editor of *Hall's Journal of Health*, says that a gum-water emetic every morning has such a grateful effect in softening the cough, removing the phlegm, and otherwise ameliorating the symptoms, that the greatest sufferers have earnestly desired permission to take the emetic two or three times a day, but that it is not necessary, as the lungs are soon cleared out, and by employing means to avoid taking cold, and thus prevent the formation of more phlegm, permanent good health is sometimes regained, without a day's confinement to the house.

[See Tract on "Bronchitis and Kindred Diseases." Address Publisher of *Hall's Journal of Health*, New York, with fifteen cents.

MIXTURE OF SULPHURIC AND NITRIC ACIDS A SOLVENT OF GOLD.—A. Reynolds writes to the *Chemical News*, "While examining an alloy of silver and gold for the purpose of ascertaining the percentage of gold that it contained, I found to my surprise, that a mixture of sulphuric acid and nitric acid dissolves gold to a considerable extent. This fact seemed to be of some importance, and being unaware of a similar observation having been hitherto made, I send you a note of it."

THE POWER REQUIRED TO START A TRAIN.

The query propounded by Mr. H. B. Morrison, of Le Roy, N. Y., on page 164, current volume, of the SCIENTIFIC AMERICAN, has excited very great interest, and, simple as the question is, there are no two persons who have agreed upon the same solution of it. Some of our correspondents have indeed arrived at the same conclusion, but their methods of arriving at it are quite diverse, so that if one is right the other must be wrong. Before proceeding further we will present one letter from Mr. J. J. Coombs, of the Patent Office.

MESSRS. EDITORS:—In your paper of the 10th inst., in answer to the query—"Will it take more power to start a train when the crank is on the upper half center than when it is on the lower half center?" You say—"It will take more power on the lower half center than on the upper;" and you give as the reason that when the crank is on the upper half center the power of a lever of the first class is exerted, in which the fulcrum (being the center of the axle) is between the power (in this case the crank) and the work (in this case the adhesion of the tire to the track.) But when the crank is on the lower half center the lever becomes one of the third class, wherein the power is applied between the fulcrum and the work."

Is not this last proposition, at least, erroneous? From an off-hand view of the subject it so appears to me. I cannot perceive that any propelling power is exerted *directly* upon the driving wheels by the crank, when it is on the lower half center; and in respect to the *indirect* power exerted over them (hereinafter explained) it it appears to me that the leverage is of the same class as during the forward stroke, viz.: that class wherein the work is between the fulcrum and the power; and which, by the way, is the most efficient class.

It is manifest that if the power were applied to any point not on or connected with the car, no amount of back pressure upon the crank, when on the lower half center, could have the slightest tendency to move the car forward. It could only cause the wheel to roll back, or to slip upon the track. When the crank is in this position the only *propelling* power operating upon the so-called driving wheels, is a draft upon their axle, through the frame which couples them with the truck supporting the cylinder. and this power is derived from the pressure of the steam on the forward cylinder-head, which must move forward, propelling the truck with it, because the back pressure upon the piston is resisted at the point of contact between the tire and the rail. In other words, the primary propelling power is exerted upon the truck which supports the cylinder, and this is forced forward upon the same principle that a boat is propelled by means of a setting pole.

Considered as a lever, when the crank is making its backward stroke, the axle becomes the power, the point of contact between the tire and the rail, the fulcrum, and the crank the work, it being the point on the wheel which arrests the backward pressure upon the piston, and so transfers the work to the forward head of the cylinder. But when the crank is making its forward stroke it (the crank) becomes the power and the axle the work; the fulcrum remaining as before.

If these propositions are true it might seem to follow that it would require less power to start the train when the crank is on the lower half center than when in the opposite position, because, while the distance between the power and the work is the same in both cases the distance between the work and the fulcrum is least when on the lower half center. But in fact the power required is the same, whether the crank be in the one position or the other. The reason is, that when the crank is on the lower half center the whole back pressure of the piston does not find its resistance on the rail, but it is divided between the point of contact of the tire with the rail and the axle; and the ratio of this back pressure thrown upon the axle will be in exact proportion to the difference between the work and the fulcrum, at the two opposite positions of the crank above mentioned; or, what is the same thing, to the difference between the radius of the crank and that of the wheel. In other words, the propelling purpose will be just equal to the back pressure thrown upon the rail.

To illustrate, let us suppose the crank to be just half the radius of the wheel, say the frame one foot and the latter two feet, and the pressure of the steam on the piston to be 1,000 pounds. When the crank is on the upper half center the work (then being the axle) will be one foot from the power (or crank) and two feet from the fulcrum. It is manifest that a forward pressure of 1,000 pounds on the crank will give a forward pressure of 1,500 on the axle (or work.) But from this must be deducted 1,000 pounds of back pressure on the rear-cylinder head, in order to find the absolute propelling pressure exerted on the axle, which is 500 pounds.

Now, suppose the crank has passed round to the lower half center, the work (now being the crank) will be midway between the fulcrum and the power (or axle) consequently the back pressure of the piston will be equally divided between the rail and the axle, each receiving 500 pounds. From the pressure of 1,000 pounds on the front cylinder head, therefore, we must deduct the 500 pounds of back pressure thrown upon the axle, in order to find the absolute propelling pressure, exerted primarily on the track supporting the cylinder; which, as in the previous case, will be just 500 pounds.

If the crank be just equal to the radius of the wheel, then, when on the lower half center, the fulcrum and the work will coincide, and the work, being immediately on the rail, the latter will receive the whole back pressure of the piston, none of it being thrown upon the axle. The propelling pressure, therefore, will be the whole 1,000 pounds' pressure on the front cylinder head. And when the crank is on the upper half center the work will be midway between the power and the fulcrum, and therefore 1,000 pounds forward pressure on the crank will give 2,000 pounds pressure on the axle; from which deduct 1,000 pounds back pressure, and we have left 1,000 pounds on the absolute propelling power exerted on the axle, being the same as when the crank was in the opposite position.

Washington, Sept. 13th, 1864.

Here is still another letter, which takes a different view of the matter from the writer of the letter above.

MESSRS. EDITORS:—Mr. H. B. Morrison, of Le Roy, N. Y., furnishes a diagram of a locomotive driving wheel, for No. XI., current volume of the SCIENTIFIC AMERICAN, and makes the following inquiry:—

"Will it take any more power to start a train when the crank is on the upper half center than when it is on the lower half center, as shown by the heavy and light lines on the diagram?" (See page 164.)

Immediately following is the answer to the query, viz:—

"It will take more power on the lower center than the upper, for this reason," &c. The reason here appended is incorrect, and consequently the answer cannot be correct. The efficiency of a lever is not determined by the class to which it belongs—first, second or third—but by the ratio of the distance of the "power" from the fulcrum to the distance of the "resistance" from the fulcrum. Levers of the third class are generally called the least efficient, because with them the "resistance" must *always* have the long arm, and consequently power is always lost. With levers of the second class the "*power*" must always have the long arm and consequently advantage is always gained. With levers of the first class *either* the "power" or the "resistance" may have the long arm, therefore, circumstances must determine whether advantage is gained or lost.

The law of the lever is—*The "power multiplied by its distance from the fulcrum, equals the "resistance" multiplied by its distance from the fulcrum."*

In the case of the "driving-wheel," let the "resistance" (the adhesion of the tire to the track) be called R; its distance from the fulcrum (the axle) be called T; let the "power" (the force exerted by the piston rod) be called P, and its distance from the fulcrum, when at the lower half-center, D, when at the upper half-center, D'. Then, according to the law above-stated, $P \bowtie D = R \bowtie T$, when the crank is at the lower half-center, and $P \bowtie D' = R \bowtie T$, when the crank is at the upper half-center. To find the power in either case we have the following:—$P = \frac{RT}{D}$ when the crank is below, and $P = \frac{RT}{D'}$ when the crank is above. The dividend is the same in each case, but D'=D. Therefore, P will be the same in each case. In other words:—It will take just the *same* power to start a train, whether the crank is on the upper half-center or whether it is on the lower.

Believing the answer given on page 164 is incorrect, and that the SCIENTIFIC AMERICAN is searching to establish truth rather than to defend a previously-expressed opinion, I submit the above, hoping it will find a place in your columns.

MORRIS PECK.

Cincinnati, Sept. 9, 1864.

From Natick we have this answer to the query:—

MESSRS. EDITORS:—In your issue of Sept. 10th, in answer to the query of H. B. M.—"Will it take more power to start a train when the crank is on the upper half-center than when on the lower half-center?"

Although you arrive at the correct result, viz:—that it will take more power on the lower than on the upper center, yet it seems to me that your reasoning is not correct. Is not this the true philosophy of the matter. Every lever has three essential points, viz:—the fulcrum or stationary point, about which the lever moves, the point at which the power is applied, and the point at which the weight or work is applied. For the sake of brevity let us call the first of these points, F, the second, P, and the third, W. Now, in all levers, whether of the first, second, or third class, the efficiency is in proportion to the relative distances of P and W from F. In the diagram you publish, the true fulcrum is at the periphery of the wheel, where it is in contact with the rail, the center of the axle is W, and the crank pin, P; consequently when the crank is on the upper center, P is farther from F than when on the lower center; so it will take less pressure to start when on the upper than when on the lower center.

STEPHEN MOORE.

Natick, Sept. 14th, 1864.

And from Clinton, Mass., this one—

MESSRS. EDITORS:—On page 164, No. 11, of your paper, present volume, I notice what appears to me a mistake in the answer given Mr. H. B. Morrison in regard to the power required to start a train when the crank is on the upper and lower half centers respectively. I am not sure that I understand what is meant by the statement that "levers are of three classes—first, second and third—and their efficiency is in the same ratio." If it means that a lever of the first class is more efficient than one of the second, and one of the second more so than one of the third (though I can hardly believe it does so mean) I submit that it is entirely erroneous. With regard to the power required to start a train, it appears to me that the *work* (considered as the "adhesion of the tire to the track") is at the extremity of one arm of a lever, which arm is equal to the distance from the center of the axle to the rim of the wheel, and is always of the same length, while the *power* is applied to the extremity of the other arm of the lever, which arm is equal to the distance from the center of the axle to the center of the crank-pin, and *this* arm is of the same length, whether the crank be upon the upper or lower half-center. Therefore, it seems clear to me that the power required to start the train is *the same*, whether the crank be upon the upper or lower half-center, and that the answer given Mr. M. is incorrect.

S. W. FOSDICK.

Clinton, Mass., Sept. 8th, 1864.

MESSRS. EDITORS:—A journal so honest and accurate as yours will be willing, and can afford, to be corrected when it happens to make a mistake. Your statement on page 164 (current volume) is perfectly correct, that it requires more power to start a train with the crank on the lower half-center than on the upper. But your explanation is sadly at fault. You say "levers are of three classes--first, second and third—and their effi-

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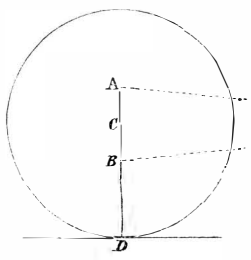
ciency is in the same ratio." This is not true, as levers of the third and second classes may be as efficient as some levers of the first. You also say that the axle is the fulcrum and the part of the wheel on the rail is the point where the weight is applied. If such were the case the power required would be the same in both cases, as can be easily proved.



Let C be the center of the wheel resting on the rail at D, and A B the positions of the crank at upper and lower half-center respectively. Now, let P be the power required to move the train with the crank at A, and P′ the power at B; W the weight to be moved, which, according to your supposition, acts at D, while the fulcrum is at G. Also, let AC or CB=b, and CD=a, now in any lever,

$$\text{power} = \frac{\text{weight} \bowtie \text{distance of weight from fulcrum.}}{\text{distance of power from fulcrum.}}$$

Applying this we have

$$P = \frac{W \times a}{b}$$

$$P' = \frac{W \times a}{b}$$

which means that the power is the same in both cases, which is not true. The error lies in assuming the point, C, as the fulcrum, instead of D. The point C is really the place where the weight to be moved is applied; D is the fixed point or fulcrum. With these suppositions, then, apply the formula for the power before given, and we have

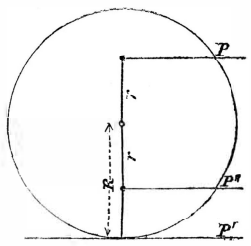
$$P = \frac{W \times a}{a+b}, \qquad P = \frac{W \times a}{a-b}$$

These fractions have the same numerator, but the denominator of the second is the smallest, hence the fraction is the largest, or P′ is greater than P; in other words, it will take more power to start a train on the lower than on the upper half-center. This is the true explanation. SETH C. CHANDLER, JR.

Boston, Sept. 9th, 1864.

MESSRS. EDITORS:—Your edition of the 10th inst. contains a query, viz.:—"Will it take any more power to start a train when the crank is on the upper half-center than when it is on the lower half-center?"

The reason given for the first statement in the solution proves nothing, unless it be its incorrectness. It says that levers are of three classes; that when the crank is on the upper half-center it forms a lever of the first class; and when on the lower half-center one of the third—the center of the wheel being the fulcrum. All very true. The next statement, that, "therefore it would take more power to move the train when on the lower center than when on the upper" is not logical, and must be incorrect. For the class of lever has nothing to do with the power when the lengths of the lever are the same, except in giving direction. A given weight will lift the same amount when applied to the lever of the first class, as when applied to the third.



Suppose, for convenience, we put the two positions of the crank in the same straight line, and apply the powers perpendicularly, as shown on the diagram. The center of the wheel is the fulcrum, the crank is one lever, r; the radius of the wheel, R, is the other; neither will change in length. The power, P, through the lever, r, is just sufficient to overcome the power, P′, working through the lever, R. The power, P″, working through, r, is also just sufficient to overcome the power, P′, through R. Condensing these statements we have Pr=P′R when on the upper center, and P″r=P′R when on the lower center, and "Things which are equal to the same thing are equal to each other," hence Pr=P″r or P=P″; no more power is required to move the train from the lower than from the upper center.

H. J. JOHNSON.

Providence, R. I., Sept. 17th, 1864.

It is related of Prof. Whewell, so famous for his vast learning, that he made a certain statement in one of his lectures, and after the lecture one of the class reminded him that he stated exactly the reverse the week before. He replied, "Don't you think I know more than I did last week?"

On page 164 we gave to a correspondent an answer, which, on more careful examination, we see was incorrect. It is manifest that the power required to start a train would be precisely the same, whether the crank was turned vertically upward or vertically downward.

A Change in Currency and Wages.

For a long time the wages of mechanics were maintained in California by the influence of the Placer mines. When a man could make his $6 per day with a sluice anywhere between Mariposa and Downieville, carpenters could not be hired in San Francisco for $5. But the Placer mines are almost exhausted. The solitary miner without capital has now no career open before him. The placers of the Sierra Nevada and of Frazer River; the argentiferous deposits of Washoe and Reese River, and prospecting for gold, silver, copper and coal have been successively "played out" as "spheres" for poor men generally, and now their chief reliance is in work for wages at a fixed price. Our labor market has a downward tendency. As the wages of the mechanic fell from $16 per day in '49 to $8 in '51, and to $6 in '43, and to $4 in '56, so they will go on falling hereafter. There may be no decrease this year or next, but no combinations can defy the laws of trade. It is plain that the laboring class would lose by the overthrow of our gold currency.—*Alta California.*

MISCELLANEOUS SUMMARY.

POVERTY A RELATIVE TERM.—Bulwer says that poverty is only an idea, in nine cases out of ten. Some men with ten thousand dollars a year suffer more for want of means than others with three hundred. The reason is, the richer man has artificial wants. His income is ten thousand, and he suffers enough from being dunned for unpaid debts to kill a sensitive man. A man who earns a dollar a day, and does not run in debt, is the happiest of the two. Very few people who have never been rich will believe this, but it is as true as God's word. There are thousands and thousands with princely incomes who never know a moment's peace because they live above their means. There is really more happiness in the world among working people than among those who are called rich.

INVENTION OF THE HAND GEAR.—It has been said that we are indebted for the important invention in the steam-engine, termed hand gear, by which its valves or cocks are worked by the machine itself, to an idle boy named Humphrey Potter, who, being employed to stop and open a valve, saw that he could save himself the trouble of attending and watching it, by fixing a plug upon a part of the machine which came to the place at the proper times, in consequence of the general movement. If this anecdote be true, what does it prove? That Humphrey Potter might be very idle, but that he was, at the same time, very ingenious. It was a contrivance, not the result of accident, but of acute observation and successful experiment.

HOME OF THE MUSCOVY DUCK.—At a meeting of the Academy of Natural Sciences, Philadelphia, Mr. Hill stated that the habitat of the Muscovy duck is the Lake of Nicaragua. There travelers see them at all times, either in small breeding coteries, or large flocks. In the wild state their plumage is dark without any admixture of white. They were originally procured from the Mosquito shore, the country of the Muysca Indians (see Humboldt's researches), and hence is derived the name of Musco duck, corrupted into Muscovy duck. The West Indian Islanders had early naturalized them, for on the discovery of Columbus, they speak of "ducks as large as geese," that they found among the Indians.

ENORMOUS BELTS.—The Boston *Commercial Bulletin* says:—"Messrs. Edward Page & Co. had on exhibition in State street, this week, five immense belts, made of heavy slaughter whole hides. The two longer were 246½ feet long, and 28 inches wide, double thickness throughout, and consuming 200 whole hides, and weighing nearly 1,000 lbs. each. These belts were made for the grain elevator of the Michigan Central Railroad Company. They were manufactured at Lawrence, Mass.

C. S. HUBBARD, of New Haven, Conn., Agent for Parson Brownlow's *Knoxville Whig*, has been notified that the non-reception of recent numbers of the paper has been owing to Wheeler's cutting railroad communication in Tennessee, thereby interrupting the transmission of the paper to Eastern subscribers. The missing numbers will be replaced by other numbers in the future.

DR. RICHARDSON, an English chemist, says that iodine, placed in a small box, with a perforated lid, destroys organic poison in rooms. During the continuance of an epidemic small-pox in London he saw the method used with benefit.

HAIR BRUSHES may be well and quickly cleaned, without wetting, by striking them, bristles down, flatly on a table. The dust shakes out and the down may be combed off.

THE *Magic*, of Bristol, R. I., a boat which beat everything easily at the Bridgeport regatta, was built and is owned and sailed by a blind man.

ENGLAND'S iron-clad fleet already afloat includes nineteen vessels, the largest of which carries forty guns and the smallest four guns, the aggregate being 409 guns, with a tunnage of 71,958 and horse-power 14,762. She has thirty-nine other iron-cased ships afloat, having from one to sixteen guns, and twelve powerful ships under construction, which will carry in all 255 guns, are of 43,160 tuns burthen, and 9,527 horse-power. Some of those vessels have cost as high as £381,000, or nearly two millions of dollars. England has expended $23,000,000 during the past year in building her iron-clad navy, a sum almost as large as it has cost our Government to build all the monitors, we being at war and England at peace. There will be thirty of these English iron-clads capable of firing a broadside. We have but one broadside iron-clad, the *Ironsides*.

A COSTLY DAM.—The *Railway Times* says:—"The cost of the mammoth dam nearly completed across the Deerfield river at the Hoosac tunnel, will be at least half a million dollars. The water power furnished by it is to be used to drive machinery for operating drills in the tunnel and furnishing it with air. The State has purchased ten and a half acres of land around the central shaft, which is the largest and deepest shaft ever sunk, the only one approaching it being one of 820 feet in depth to reach the tunnel grade. Only 60 feet of this distance is now accomplished, the size being 85 by 97 feet.

USELESSNESS OF EARTHING UP POTATOES.—By drawing up the earth over the potato, in sloping ridges, it is deprived of its due supply of moisture by rains, for when they fall the water is cast into the ditches Further, in regard to the idea, that by thus earthing up the number of tubers is increased, the effect is quite the reverse; for experience proves that a potato placed an inch only under the surface of the earth, will produce more tubers than one planted at the depth of a foot.

THE "west shaft" at the Hoosic tunnel is now sunk about 420 feet, and the temperature at the bottom during the warmest day is 35 degrees. The depth of water in the mountain is about nine feet, and the engine employed at the shaft removes 25 gallons each revolution. The engine also works a fan by which the men are supplied with air. The number of men employed on the west side of the mountain is 350.

A Submarine Vessel.

A correspondent who has been down in the submarine vessel recently invented and manufactured in this city by S. S. Merriam, and just tested by himself and the Government near New York, sends us the following account of his experiences:—"Entering the singular vessel from the top, the door was closed, and the order, 'Men, to your places' given to the little crew, who promptly obeyed. When everything was ready, Mr. Merriam turned some valves and the compressed air came hissing in, producing an unpleasant sensation upon the drum of the ear, of which one was at once relieved by inspiring and swallowing. The vessel seemed perfectly under control, for we stopped when half down to the bottom, and raised the door on the bottom of the boat, but the air inside of course prevented any water from coming in, even enough to wet the soles of our feet. One of the crew from your city improved the opportunity to dive out and come up on the surface of the water, much to the astonishment of the spectators on the bank. He afterwards returned and entered the vessel from the bottom, when the door was closed, another and heavier rush of compressed air came in, and we were on the bed of the river, 20 odd feet under water, this distance requiring an additional pressure to resist the water with the door open. We could stand on the bottom of the river and not wet our feet, and at that distance under water could easily see to read by the light that came in at the glass windows. Bells ringing outside were also heard distinctly. To return to the rest of the world only a few strokes of the pumps were necessary; the air rushed out of the bottom and the boat was quickly on the surface of the water. We moved with a propeller easily under as well as upon the water, and in all respects the vessel worked so completely that its success is undoubted."—*Springfield Republican.*

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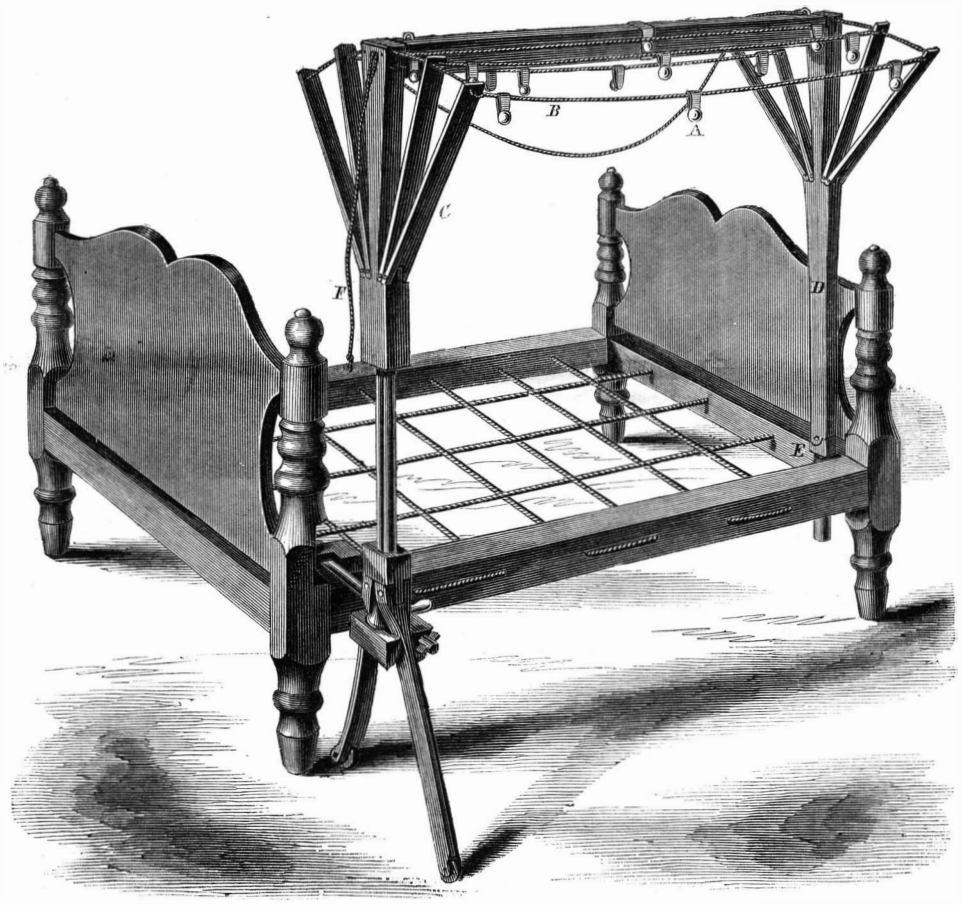
Attachment for Ventilating Bed-clothes.

It is well known among civilized people that there is no part of housekeeping that requires more attention than bedding. For comfort this is desirable, but for sanitary reasons it is very important that the clothes should be thoroughly aired and ventilated for an hour or more daily. This is very often done by placing the bed linen on chairs or over the foot-board; in so doing, however, it gets dragged on the floor and more or less soiled, besides entailing considerable labor. With this attachment the clothes are buttoned to the tapes, A, on the cords, B, which, in turn, are rove through the arms, C. The arms are attached to uprights, D, and are jointed at E, so that the apparatus can be turned down horizontally when not in use. When in use it is erected as shown, and the clothes are all drawn up or extended by pulling the cord, F. This insures thorough exposure with but little labor. The legs at one end permit the attachment to be rolled one side against the wall when necessary for making or taking down the bedstead.

The inventor says that one of these fixtures has been in use for some time, and has been highly praised by housekeepers for its utility. It is not liable to get out of order and is easily and cheaply constructed.

The invention was patented through the Scientific American Patent Agency on the 16th of August, 1864, by J. H. Martin, of Hartford, Washington county, N. Y., who can be addressed for further information. [See advertisement on another page.]



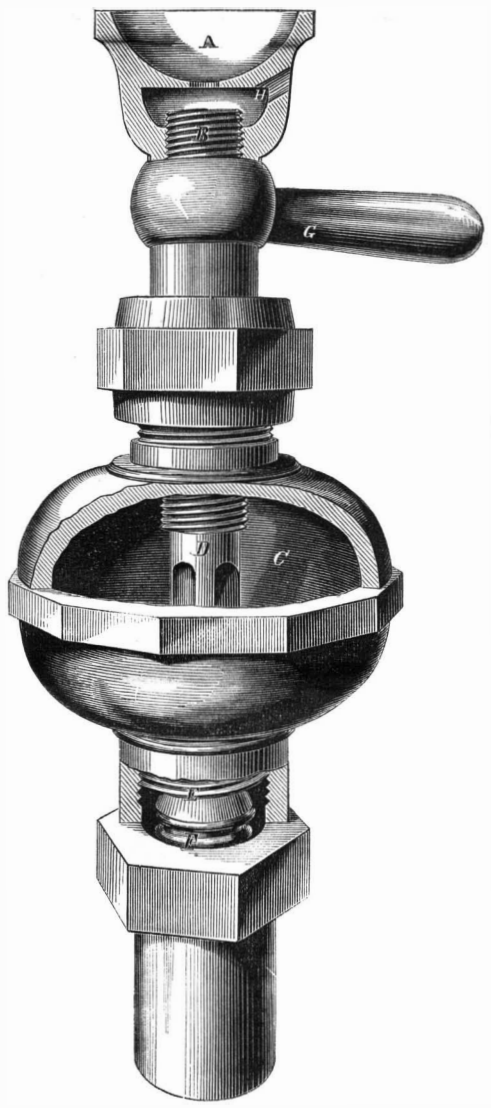
MARTIN'S ATTACHMENT FOR VENTILATING BED-CLOTHES.

A SEED-BAG.

Mr. Overton, in explaining at the Polytechnic Association the mode of raising petroleum in the oil region of Pennsylvania, stated that after the holes are bored through the earth and rock down to the cavities containing the oil, a pipe is inserted through which the oil is pumped up. As, in sinking the holes from 100 to 600 feet, several springs and streams of water are usually encountered, this water, if allowed to fall down to the bottom of the hole, would require to be raised by the pump, and would thus add materially to the expense of procuring the oil. To prevent the water from falling to the bottom of the hole the annular space around the pipe is closed water-tight near the lower end of the pipe. This is effected by surrounding the pipe with a bag some two feet in length filled with dry flax-seed. After the bag is in place the seed absorb water, and swell so as to close the space perfectly water tight.

ROSS'S LUBRICATOR.

The old-fashioned globe lubricator with its three cocks is a great nuisance. In order to lubricate a cylinder, the lower cock must be first shut, the pet cock opened to blow the steam out of the globe, the pet cock shut again, and the oil poured in, after which the upper cock must be shut and the lower one opened before the oil will flow down to its place. This is a tedious operation, and the lubricator herewith illustrated is a much better one for the purpose, In this cup but one handle has to be turned to lubricate the cylinder. The operation is as follows. Oil is poured into the cup, A, from whence it runs down through the pipe, B, into the reservoir, C. In this there is a three-sided plug, D, which has a valve seat on the pipe, B, and another seat, E, below on the bottom of the reservoir; this one is a little larger than the upper, and the plug is put in from below. There is also a spiral spring, F, bearing on the end of the plug. The oil is introduced to the reservoir by turning the handle, G, around a few times; this act unscrews the pipe, B, from the plug, D, and the oil consequently runs down into C; the spiral spring below forces the plug against its lower seat and prevents steam from blowing out during the operation. The oil runs into the cylinder from the reservoir when the handle, G, is run down as far as it can go. This forces the lower end of the plug off its seat and opens the passage to the cylinder. Steam rushes up into the reservoir and makes the pressure equable, so that there is no more in the chest than in the cup. The holes, H, allow the air to escape when oil is poured in. This cup was patented March 1st, 1864, by Robert Ross, of Bethlehem, Pa., and assigned to B. E. Lehman, of the same place. For further particulars address Mr. Lehman as above; or Felix Campbell, 79 John street, New York City.



Street Sweepings.

Dr. Littlejohn says, in a paper on the cleansing operations in Edinburgh, that by an efficient staff of scavengers, fifty thousand tuns of solid refuse are annually removed from the streets and placed in depots in the neighborhood of the town. The sale of this refuse brings into the municipal treasury £7,000 per annum. The entire cost of cleansing the city is £13,000 per annum, viz., £6,000 for wages, £6,000 for cost of conveyance of refuse to the depots, and £1,000 for wear and tear of materials. The Old Town and the poorer districts of the New Town, are visited by the wagons morning and evening; the greater proportion of the New Town only receives a morning visit. Thus all accumulations of refuse for a period longer than a few hours are prevented; the streets are thoroughly cleansed daily; a large number of men are kept in regular employment, many of whom might otherwise burden the rates; the rural districts obtain an excellent manure at a moderate cost, and the police rates are diminished by 3d. in the £1.

A Smoking Automaton.

Many men smoke mechanically, but we never heard of one before smoking by machinery other than that furnished by nature. The *Salem Gazette* says:—

"Mr. Thomas B. Russell, an ingenious machinist of this city, has exhibited to some of his friends a curious piece of mechanism which is now at his residence, No. 354 Essex street. It consists of the figure of a man, seated in a common chair, and holding a cigar in his mouth. By winding up a weight and thus setting in motion an ingenious piece of machinery, the cigar, when lighted, and also the mouth of the figure, are made, at regular intervals, to emit a steady stream of smoke, interspersed with puffs, that a professional smoker could not excel. By this process a cigar will be smoked up as quickly and naturally as a living man could do it. The machinery by which the result is accomplished, consists of a series of wheels not unlike those by which a clock is made to strike. Rubber tubes or pipes are conveyed from the mouth of the figure to bellows, which are slowly worked. Two valves, nicely adjusted, regulate the drawing in and emission of the smoke.

On the Respiration of Flowers.—M. Cahours, in a note to the French Academy of Sciences, says, that while the green parts of plants, under the influence of light, absorb carbonic acid, assimilate the carbon, and give out oxygen, the colored parts, on the contrary, under the same circumstances, absorb oxygen, and give out carbonic acid. The amount of corbonic acid evolved seemed to increase as the temperature rose; and a growing flower gave out more than a fully blown one.

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VOL. XI. NO. 14....[NEW SERIES.]....*Twentieth Year.*

NEW YORK, SATURDAY, OCTOBER 1, 1864.

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INVIDIOUS COMPARISONS.

A great many good and loyal journals, who have the welfare of the country at heart, seem to think they can best serve it by wholesale abuse of the Navy Department. From the monitors down to the wooden gunboats there is scarcely a craft that has not come in for some disparagement. We deprecate such a state of things in any event, but especially when unthinking journalists throw reason aside and make invidious comparisons for the sake of gratifying a pique.

The Boston *Commercial Bulletin*, in an article on blockade runners, says:—"The British have now afloat a superior class of swift steamers to run the blockade, while we have only the same old-fashioned vessels, many of them worn out, which we had at the commencement of the war. The vessels produced by the Navy Department have proved entirely worthless to overhaul the swift steamers sent from England. To show how blind was the Department at the beginning of the war, it is only necessary to refer to the light-draught gunboats which it built, not one of which is capable of being propelled more than eight knots, while the general run of the blockade-breakers go rarely less than twelve, and some of them as swift as sixteen knots. But for the steamers purchased from the merchant service, our blockade would have been a mere farce. It is little better at present, so far as Wilmington, N. C., is concerned. The swift British steamers pass in and out at the rate of two a day the year round, although we have nearly twenty sail of our best vessels to blockade it."

This statement is incorrect in many respects. The British vessels are for the most part built exclusively for river service, and are unfit for blockade duty, and in every case their speed has been grossly exaggerated. The fastest of them are daily caught by our ocean steamers; vessels that can lay off and on and run to sea when storms arise. The light-draught swift English boats are incapable of such endurance, and though they carry immense cargoes last no time at all, nor are they expected to. They make such profits that the owners can afford to use up a ship a month if they please. Some vessels do escape and run the blockade in the darkness; but many more are daily caught, and numbers of the blockade fleet now off Wilmington were once blockade-breakers. Surely if the English vessels are swifter than our own they ought to catch their comrades! The light-draught gunboats, built at the beginning of the war, go faster than eight knots by the pitch of their screws at a moderate number of revolutions, and we have sailed eleven knots per hour in one of them, if the patent logs tell the truth.

The double-enders are as fast as any merchant ships of their class, and have done good service, as Mobile Bay, Albemarle Sound, and engagements at other points amply show. There is nothing to be gained by indulging in phillipics against the Administration at a time when the country requires all the good words from loyal men that it can get. The Navy is a most powerful arm of it, and needs encouragement far more than the reverse. We have no disposition to apologize for any short-comings or failures of the Department, but in the matter of the blockade we believe it is doing all in its power.

A BATTERY OF 15-INCH GUNS.

On a recent visit to Fort Hamilton we found that the New Water Battery is nearly completed, and 6 of the guns are already mounted. They are all of cast-iron, of 15 inches caliber, and are mounted on wrought iron carriages. Beds are being constructed for 24 or 25 more, so that the whole battery will have 30 or 31 15-inch guns. We presume that each one of these cannon would be more efficient in preventing the passage of an iron-clad fleet through the Narrows than all of the guns of the old fort. In other words, the New Water Battery is probably a greater addition to the defenses of this harbor than would be the construction of thirty new forts like Fort Hamilton, provided they were to be armed with the old style of ordnance.

Now we should like to see two 20-inch guns placed at Fort Lafayette, as near the level of the water as possible, each mounted in a revolving turret, the walls of the turrets 2 feet in thickness and built up of as thick plates as can be conveniently made, say 4, 5, and 6 inches. Then with rafts of timber, to keep hostile fleets attempting to pass for awhile under the fire of these heavy guns, we think the southern approach to our harbor would be pretty secure.

THE MOISTURE ON A LAMP CHIMNEY.

Probably most of our readers who use petroleum lamps have observed that when the lamp is first lighted the luster of the chimney is dimmed, and the flame is obscurely seen with the outlines not sharply defined. In a minute or two the dimness disappears, and the glass presents its usual clear and transparent appearance.

This phenomenon is doubtless produced by the deposit of water upon the inner surface of the chimney. Petroleum is composed of hydrogen and carbon, and both of the elements in burning combine with the oxygen of the atmosphere—the carbon combining with oxygen to form carbonic acid, and the hydrogen combining with oxygen to form water. Both on their first production are in the gaseous form, and the carbonic acid being incondensable except under very great pressure, passes off as an invisible gas; but the water, though at first in the form of steam, requires to be cooled only down to 212° to be condensed into the liquid form. As it comes in contact with the cold walls of the chimney, it is cooled to this point, when it deposits itself as a fine dew over the inner surface of the glass.

This water, being very pure, transmits light more freely than the glass, but being deposited in hemispherical drops, the curved surfaces so refract the rays of light from their straight tracks as to prevent the formation of a clearly-defined image in the eye. The thin film of dew, though translucent, is not transparent.

So soon as the heat of the flame raises the temperature of the chimney to 212°, the water is re-evaporated, and passes off as invisible steam, leaving the glass transparent as before.

A NEW LIGHT FOR MANUFACTORIES.

Professor Seely, of this city, has obtained a patent for an electric light on a principle which very strangely does not seem to have been thought of before as the best and by far the most economical mode of producing light by electricity. He employs the current generated by an ordinary frictional electrical machine, and obtains the light by interrupting the current. It has long been known that a very brilliant and steady light might be procured in this way, but the objection to its use is the uncertainty in the action of the frictional machine. Dry air is a very poor conductor of electricity, and when a machine is excited in such an atmosphere the electricity will remain in tension for a considerable time. But moisture in the air conducts the electricity away, and when the moisture reaches a certain point the fluid is removed so rapidly that the machine will not work. Professor Seely's invention consists in devices for making the action continuous in all weathers. This is effected by surrounding the machine with a glass case, and keeping the air within the case dry by means of chloride of calcium or other hygroscopic substance.

It has been observed that when the conductor of an electric current is interrupted in a way to draw a spark across the break, the brilliancy of the spark varies with the material by which the conductor is terminated at the break. Professor Seely is now engaged in experiments to ascertain what material will produce the most intense light.

If the apparatus works according to anticipation a cotton mill may be lighted without any current expense, except the small power required to turn the electrical machines. As in mills driven by water there is always a surplus of power during the winter months, the only time when lights are required, there would be no expense for this light except the first cost of the apparatus, which would be quite moderate.

COOPER UNION—FREE NIGHT SCHOOL OF SCIENCE AND ART.

If the mechanics of this city are not an educated class the fault is their own, for no matter what advantages have been denied them, the privilege is now afforded of becoming proficient in the highest branches of art and science. The halls of the Cooper Union are to open shortly, and there instruction can be obtained by those whose time is employed during the day. Perhaps, however, a better idea of the scope of this institute can be formed by the world at large by publishing its printed circular:—

"The term commences on the first of October and ends on the first of April. The hours of recitation are from 7½ P. M. to 9 P. M., and no pupil is, under any circumstances, to be admitted after the former hour, except by special permission of the clerk. Each applicant for admission is required to be 16 years of age, and to present a letter of recommendation from his employer. No expenses whatever are incurred by the pupils, except those for the purchase of Text Books and drawing materials. All applications for admission must be presented during the month of September. Each applicant is permitted to pursue the study of any subject or subjects taught in the school, provided he is sufficiently well advanced in the preparatory studies. The following is the course of study:—Algebra, Geometry, Logarithms and Plane and Spherical Trigonometry, Analytical and Descriptive Geometry, Differential and Integral Calculus, Mechanics, Natural Philosophy, Elementary Chemistry and Chemistry applied to the Arts, Analytical and Organic Chemistry, Architectural Drawing, Mechanical Drawing, Drawing from Copy, Drawing from Cast, Drawing from Life, Perspective. The full course of study, embracing all of the above-named subjects, requires five terms for its completion, and to those who have successfully passed through it the Medal of the Cooper Union is awarded. Pupils who have successfully completed the study of any particular subject will receive Diplomas certifying to the fact. For a Mathematical course five terms are required, but only three evenings of each week are occupied. For a course in Chemistry and Natural Philosophy three terms are necessary, and but two evenings per week. For a course in Architectural or Mechanical Drawing three terms are required, and but two evenings per week; and for a course in Perspective and Drawing from Copy, Cast, and Life, three or four terms are required, according to the pupil's ability, and but three evenings in each week. At the end of each term an examination of each class is held, and to those pupils who have been regular in attendance and pass through it creditably, a certificate is awarded, either of the first, second, or third grade, according to their knowledge and ability."

All trades and professions even are equally welcome, and persons desirous of attaining higher proficiency in any course are admitted. Lectures will be given by able professors during the course, at

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certain periods, on Natural Philosophy and Chemistry; the subjects for discussion will be announced in future.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week ; the claims may be found in the official list:—

Improved Governor.—This invention consists in making the rod which opens and closes the governor or throttle valve, or which bears a similar relation to the source of power and parts to transmit said power to the working machines, with a spring and with a fly-wheel, to which an intermediate rotary motion is imparted, in such a manner that when the intervals characterizing the intermittent motion are long and consequently the motion of the fly-wheel srow, the spring has power enough to overcome the momentum of the fly-wheel and to carry the valve rod back to its original position after each stroke or motion of the fly-wheel; but if the intervals characterizing the intermittent motion of the fly-wheel shorten, and in consequence thereof the circumferential velocity of the fly-wheel increases, the momentum of the fly-wheel overcomes the power of the spring, and the valve rod moves back so as to close the valve and regulate the speed of the engine or other machine with the greatest nicety and entirely independent of the position of the governor, rendering the same of peculiar value for the purpose of regulating the speed of marine engines. Peter Louis, of 220 Center street New York, is the inventor.

Machine for coating and flocking Cloth.—The object of this invention is to coat cloth or textile fabrics in pieces a thousand yards, more or less, long, by machinery which applies the requisite coat of waterproof or other composition or varnish, and the flocks if desired, and at the same time conveys the cloth to a drying room and hangs it in folds upon stick or slats automatically. The long pieces of cloth are made up of shorter ones cemented or secured together as for calendering. The process of coating is effected while the cloth is being conveyed to the drying room, and the machine at the same time delivers a series of newly-arranged lattice frames which are supplied to it at suitable intervals and upon the slats or rounds of these frames the cloth is deposited in folds, four or more yards upon each slat, according to the hight of the room. Edwin M. Chaffee, of Providence, R. I., is the inventor.

Knitting Machine.—The object of this invention is to afford facility for what is termed narrowing and widening the work in circular knitting machines, bringing the parts nearer to or further from the center of the machine, and by reducing and increasing the number of loops in the circular courses. The invention consists, principally, in the employment in a circular knitting machine of separately-adjustable sinkers so applied in combination with the needles as to provide for their being set nearer to or further from the center of the machine and for the removal of any number of them at pleasure. It also consists in making the needle operating-cam adjustable for bringing the needles nearer to or further from the center of the machine, and in a device for adjusting the sinkers in a larger or smaller circle. It further consists in so combining the needle operating-cam, the device for adjusting the sinkers nearer to or further from the center of the machine, the yarn conductor, and the rotary-pressing burr, that they are all adjustable together toward and from the center of the machine, Charles W. Blakeslee, of Northfield, Conn., is the inventor.

Simple and Cheap Plan for Preserving Fruits.

A writer in the *Country Gentleman* says:—"Recently I have seen fruits put up upon a plan so cheap, so simple and so easily performed by any member of the family, that I am pleased to furnish it. The fruit is prepared and scalded in the ordinary way, and the jars closed while the contents are *hot*. The method of sealing is, by simply pasting over the mouth of the jar two thicknesses of stout manilla paper previously pasted together. Fruit thus put up for several years has kept perfectly sweet and sound as when put up in the best 'self-sealing' cans or jars. To render the preservation doubly sure to inexperienced persons, I would suggest several improvements upon the plan. First, I would close the jar with a cork before pasting; this would prevent any moisture coming in contact with the paper, in case the jar should be turned on one side. Second, To be sure to guard against any opening through which the air could enter, owing to any improper pasting, I would put the two pieces of paper in separately, making the outside half an inch larger, so as to extend a little below the first around the neck of the jar, thus covering any defect that may have been left in the first, firmly pasting both together; and last, I would cover the whole with a thin coat of shellac or gumarabic. The whole process is very simple, more easily prepared than any that I have seen practiced."

ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING SEPTEMBER 20, 1864.

Reported Officially for the Scientific American.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

44,273.—Corn Planter.—J. Armstrong, Jr., Elmira, Ill.:

I claim, first, The friction rollers, d d, placed in the loops, E, in combination with the treadle frame, E, as and for the purpose specified.

Second, The stirrers, P, when arranged or hung so as to be operated from the slide, K, substantially as herein set forth.

[This invention relates to a new and useful machine for planting corn, both in hills and drills, and it consists in a novel arrangement of the framing, whereby the part on which the seed dropping mechanism is placed, and the part in which the wheels are fitted may have a certain action or movement independent of each other, and the framing allowed to conform to the inequalities of the surface of the ground over which it passes.]

44,274.—Cattle Pump.—John B. Atwater, Chicago, Ill.:

I claim, first, The apparatus consisting of the cylinders, A and B, connected by the pipe, C, and provided with the discharge pipe, H, operating in combination with the piston, D, provided with stem, a, and box, b, or its equivalent.

Second, In combination with the foregoing I claim regulating and adapting the apparatus to be operated by animals of various weights, by means of weights applied to the box, b, substantially as specified.

Third, I claim securing and holding the piston, D, and tilting platform in position by means of the spring catch, e, or it equivalent.

44,275.—Stitch for Soles and Vamps.—Lyman R. Blake, Quincy, Mass.:

I claim the employment of the new stitch for uniting soles and vamps of boots and shoes, and for a similar use in other manufactures, in the manner substantially as described.

44,276.—Windlass.—Marcus Bockman, Brooklyn, N. Y.:

I claim the shafts, C D E, cog wheels, F F H, levers, K, and spools, Y, in their specified combination on the bench, B, constructed and arranged substantially as specified.

44,277.—Harvesting Machine.—Jeremy Bradley, Cedar Falls, Iowa :

I claim, first, The combination of an endless chain-raking apparatus having horizontal driving shafts, with the jointed shafting, d m, sliding pinion, k, side gear, J, and lever, L, arranged and operating substantially as described.

Second, The toothed segments applied to guide, H, in combination with rakes which are pivoted to, and operated by, endless chains, and otherwise constructed and adapted for being brought into raking position by said segments, substantially as described.

Third, The combination of open slatted platform, e, endless chain of rakes and toothed segments, for turning the rakes at the commencement of the raking stroke.

Fourth, The combination of the two levers, L L', pinions, K K', inclined shafts, m m', driving wheel, B, cutting apparatus, and endless chain of rakes, all arranged and operating substantially as described.

44,278.—Mode of connecting Cars to Trucks.—Alfred Bridges, Newton, Mass.:

I claim, first, In railroad cars the spring, H, on the truck frame, so combined and arranged with the suspension rod, G, or its equivalent, that it controls both vertical and side motions, substantially as herein set forth.

Second, I claim the combination of the two springs, H and N, with the truck frame, D d, substantially in the manner and for the purposes herein specified.

Third, I claim the thimble, h, when used with the spring, H, truck frame, D d, suspension rod, G, and pedestal, F, substantially in the manner and for the purposes herein specified.

44,279.—Bed Bottom.—James Bromiley, Pawtucket, R. I.:

I claim a bed bottom composed of slats, *B*, connected at their ends to elastic straps, C, by means of clamps, F, constructed and applied as shown, and the straps, C, secured to the head and foot rails of the bedstead by means of the hooks, D, fitted in the straps, substantially as described.

[This invention relates to a new and improved bed bottom of that class which are composed of a series of parallel slats, connected at their ends by elastic straps to the head and footrails of the bedstead. The invention consists in a novel manner of attaching the elastic straps to the slats, and also in attaching said straps to the head and foot rails of the bedstead, whereby all rails, screws, and bolts are avoided, the slats and bands readily connected and disconnected, and also readily applied to the bedstead, and a greater or less number of slats used, as circumstances may require.]

44,280.—Fruit Basket.—Henry Carpenter, New York City :

I claim a peach or fruit basket, provided with a vertical central partition and lids or covers, substantially as herein shown and described.

[This invention consists in having the basket made of double the capacity of these now used for holding peaches and other fruit, and providing the same with a central partition and two lids, as hereinafter fully shown and described, whereby the expense of transportation is reduced one-half, and the baskets rendered capable of being stowed one on the top of the other without having their contents injured.]

44,281.—Apparatus for coating and flocking Cloth.—Edwin M. Chaffee, Providence, R. I.:

I claim, first, The rollers, A C F G I J K L, and doctor, E, or their equivalents, arranged in relation to each other and to the cloth, substantially in the manner herein described, so that long pieces of cloth can be coated and conveyed to the drying room without bringing the face or varnished side of the cloth in contact with the rollers or anything else except the edge of the doctor.

Second, The employment or use of two toothed wheels, j, arranged substantially as herein specified, to check the fall of the cloth at the desired intervals.

Third, The jointed arms, k l, in combination with the toothed wheels, j, to act substantially as and for the purpose set forth.

Fourth, The combination of the rock-shaft, m, adjustable arms, k l, and wheels, j, substantially as herein specified, to insure the simultaneous catching of both edges of the cloth.

Fifth, The employment of the lattice frames, M, substantially in the manner set forth for the purpose of supporting the cloth while in the drying room.

44,282.—Pump.—John K. Cohick and Jacob Fesher, Mountville, Pa.:

We claim the action of the pump, P, by means of the oscillating beam, c, and jointed connecting rods and piston, f d, in connection with the crank, XI, and triple gearing when operated by a weight and pulley, in combination with a fly-wheel, X, and lever arm, L, click, n, and ratchet, m, and side support, t, all constructed and operating substantially in the manner and for the purpose specified.

44,283.—Spinning Machine.—E. C. Cleveland, Worcester, Mass.:

I claim, first, Enclosing the lifter, C, and the clock and their appurtenance within the arch and one of the posts of the frame, substantially as described.

Second, The locking slide, e, constructed and operated substantially as shown, for locking the lifter, C.

Third, The lifter, C, for operating the clock, constructed and operated substantially as shown.

Fourth, Adjusting the relative positions of the hand wheel shaft and the tin cylinder shaft, in the manner substantially as described.

Fifth, The combination of the bearing of the hand wheel shaft with the means employed for adjusting the inner end of the shaft, substantially as described.

[This invention consists in certain improvements in the construction of jacks whereby I am enabled to place the clock, for indicating the amount of work done, and its mechanism within the frame of the jack; and also in the construction of the mechanism for causing the clock to indicate the work of the jack, and in the manner of operating said mechanism, and also in the manner of constructing and adjusting the bearings of the shaft which drives the shaft of the tin cylinders.]

44,284.—Washing Machine.—Luman W. Cook, Dowagiac, Mich.:

I claim, first, The arrangement and combination of vibrating arms, B, longitudinal arms, C, raised boards, g, and levers, E, substantially as described.

Second, The application of the beaters, D, to longitudinal swinging arms, C, in combination with the divisions, a a g g, and vibrating levers, E, substantially as described.

Third, The arrangement of the vibrating arms, B, longitudinal arms, C, and vibrating levers, E, within a wash-box, constructed substantially as described, in such manner as to admit of the ready removal and replacing of said parts, as herein described.

44,285.—Composition for preserving and Water-proofing Vegetable Fibers.—George A Cowles, Jesse P. Chase, and Victor Vierow, New York City:

We claim, first, The use of a composition of alum and blue vitriol, mixed together, substantially in the manner and about in the proportion above set forth.

Second, The use of a composition of alum and vitriol, mixed with gelatine, or with soap, or with a mixture of gelatine and soap or oil, substantially in the manner and about in the proportion specified.

Third, The employment of acetate of lead, with or without gum arabic, in combination with the ingredients hereinbefore named and mixed together, substantially in the manner and about in the proportion set forth.

[This composition has been applied with great success to sails and other similar articles exposed to the influence of the atmosphere, also to clothes and other textile material.]

44,286.—Clasp for Shoe Lacings.—William E. Darrah, Middletown, N. Y.:

I claim, as an improved article of manufacture, a clasp for lacings, made in one piece, but with double string plates, a b, disconnected at the outer corners, and central channel, c, all as herein shown and described.

[The object of this invention is a clasp, produced by folding over a piece of sheet metal in such a manner that the plates or jaws are formed with a suitable opening to let the strings of a shoe, or lacing of any other description, pass freely, and to return the ends of said strings or lacings, when the same are drawn midways between the two plates or jaws.]

44,287.—Skeleton Skirt.—Theodore D. Day, Brooklyn, N. Y.:

I claim, first, Forming the hoops of the skirt with joints at the back, so that the springs or hoops will fall more easily when the person is seated, as set forth.

Second, I claim uniting the ends of the springs or hoops of a skeleton skirt, by means of the tapes or strips receiving the said ends, in the manner specified.

44,288.—Potato Digger.—Daniel N. Denman, Millburn, N. J. Ante-dated Sept. 5, 1864 :

I claim in a potato digger, of the construction specified, arranging the two driving wheels F F, directly behind the landsides, C C, as herein described and for the purposes specified.

[This invention consists in the employment or use of an inclined curved screen, provided with a share and landsides, and having a toothed shaft placed underneath the back and curved part of the screen ; the teeth of the shaft working through the screen, and the shaft being rotated by a traction wheel placed behind one of the landsides, whereby a very simple and efficient potato digger is obtained, and one that may be advantageously used for cultivating or preparing the earth for the reception of seed, etc.]

44,289.—Cattle Pump.—Joseph A. Dickson, Sandwich, Ill.:

I claim the radius frame, D, provided with the trough, J, and connected with a pump, or any suitable waterelevator in such a manner that the animal in its effort to drink will rotate the frame, and thereby actuate the pump and supply the trough with water, substantially as set forth.

I further claim the way, B, in connection with the frame, D, provided with the water receptacle, I, and trough, J, or its equivalent communicating with each other by a trough or tube, L, all arranged to operate substantially as and for the purpose specified.

[This invention relates to a new and improved pump by which cattle themselves may pump up at will the water they require for drinking purposes. The invention consists in having an elevated annular way around and concentric with an ordinary section or force pump, and having one end of a frame fitted loosely on the pump and the other end extending out to the way, said frame having a trough at-

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tached to its outer end and a water receptacle at its inner end from which the water flows into the trough through a tube. The frame being provided with a roller which rests upon the way and which by means of a pitman and walking beam operates the pump as the trough and frame are moved around by the cattle in their effort to drink from the trough.)

44,290.—Breech-loading Fire-arm.—Wm. C. Dodge, Washington, D. C.:

I claim, first, So constructing and combining the stock, guard, barrel and retractor of a breech-loading gun, as that a single movement of the guard shall both elevate the barrel and operate the retractor, without the aid or use of any other parts than those herein mentioned.

Second, I claim the lever guard, C, constructed and operating in the manner and for the purpose substantially as above set forth.

Third, I claim the combination of the lever-guard, C. and the cartridge retractor of a breech-loading gun, when constructed and operating substantially as shown and described.

44,291.—Riding Stirrup.—R. N. Eagle, Washington, D. C.:

I claim, first, A stirrup or stirrup frame of wood with arms separate at their upper ends to be indirectly connected by means of a ferrule or loop, or by the suspension strap in any manner, substantially as described.

Second, I claim suspending a stirrup by means of a strap passing between the ends of the arms and secured without the aid of any block employed to connect the said arms.

Third, I claim the inner or upper tread, J, projecting forward to constitute the lower part of the hood or toe cap or rearward to afford an additional foot-rest at back.

Fourth, I claim a stirrup or stirrup frame of wood or other material provided with slots at any desired points intermediate between the tread and shoulder or upper part of the arms, for the reception of the suspension strap, substantially as described.

44,292.—Riding Stirrup, etc.—Robert N. Eagle, Washington, D. C.:

I claim, first, A stirrup or stirrup frame of bent wood, with arms and tread of equal thickness.

Second, I claim one or more slips or blocks, K and K', of metal or other suitable material applied to or between the upper ends of the arms to strengthen the same and prevent splitting, substantially as described.

Third, I claim a stirrup or stirrup frame of wood with one or more apertures or cavities, M and N, or partial excavations in lieu thereof, substantially as and for the purposes set forth.

Fourth, I claim the shaping or profeling of a stirrup or stirrup frame of wood, by means of concavities or convexities in the rear and front outlines of the tread, or arms thereof, in any manner substantially as and for the purposes set forth.

Fifth, I claim a stirrup hood or toe cap, formed on, or in suitable blocks ordees, in combination with an opaque material to produce the required surface, and for other purposes, substantially as described.

44,293.—Apparatus for Pressing Hats and Bonnets.—Wm. E. Doubleday, Brooklyn, N. Y.:

I claim confining the edges of the material around the edges of the concave die in the formation of hats and bonnets, for the purposes and substantially as specified.

44,294.—Glue and Water Heater.—Joseph Edgecomb, Worcester, Mass.:

I claim the combination of the conical reflector, F, with the lamp and water receptacle. substantially in the manner and for the purposes herein described.

I also claim attaching the reflector, F, to the lamp in such a manner that it can readily be removed therefrom, and that when removed the lamp may be used as an ordinary lamp, substantially in the manner herein described.

I also claim the combination with the lamp of the detachable reflector, F, and water receptacle, I, when the several parts are secured to each other, and when constructed and arranged as herein shown and described.

44,295.—Heating Stove or Furnace.—Adam Ernst, Milwaukie, Wis.:

I claim in combination with the pipes, a, which constitute the firepot of the furnace, the cold air chambers, D E and F, whether said pipes are set close together or with spaces, m, between them, substantially in the manner and for the purposes described.

I also claim in combination with the pipes, a, constituting the firepot of the furnace, the double radiating drum, I K, when constructed with an inner flue, k, substantially as and for the purpose described.

I also claim the combination of the pipes, a, cold air chambers, D E F, and double-radiating drums, K I, when constructed and arranged as and for the purpose herein described.

44,296.—Apparatus for Boring Cylinders.—L. B. Flanders, Philadelphia, Pa.:

I claim, first, The combination of the boring bar, B, its sleeves or bearings, E and E', and the cross-plates, D and D', with their set screws, c, the whole being constructed and arranged for application to and for the adjustment of the boring bar central with a cylinder, substantially as set forth.

Second, The combination of the boring bar, B, the casing, H, and the train of wheels, I J and K, or their equivalents, the whole being arranged and operating substantially as described.

Third, The collar, e', attached to the boring bar and confined within the sleeve or bearing, E', substantially as described.

Fourth, The block, K, adapted to the cutting-head, G, to the boring bar, B, and screw, C, substantially as described so as to serve as a nut for the screw and as a key for preventing the cutting head from turning on the bar.

Fifth, The combination of the boring bar, B, its screw, C, and casing, M, or its equivalent, central shaft, p, and the train of wheels herein described or the equivalent to the same for the purpose specified.

Sixth, The detachable bracket, U, and its spindle carrying the bevel wheel, t. in combination with the casing, H, its shaft, L, and the bevel wheel, t.

Seventh, The tapering block, P, its inclined keys, 2, screw, u, and nut, u', the whole being constructed for central attachment to the head of a steam cylinder and for forming a bearing for one end of the boring bar, substantially as set forth.

Eighth, The plate, Q, its central pin, x, radial sliding bars, R, and the block, T, with its cam like projections, y, the whole being arranged and operating substantially as and for the purpose specified.

44,297.—Oil Cup.—Jacob Foyle, Putnam, Ohio:

I claim the longitudinally sliding globe, B, and receiving cup, C, in combination with the tube, A, holes, j k l, and vent pipe, m, constructed and operating in the manner and for the purpose substantially as set forth.

Also the stuffing boxes, b c, above and below the oil cup, B, in combination with the pipe, A, constructed and operating in the manner and for the purpose substantially as herein specified.

[This invention consists in a vertically or longitudinally sliding globe and oil receiver, in combination with a tube leading to the steam cylinder or other part to be lubricated and provided with holes situated at different levels and separated by a transverse partition and with a vent pipe in such a manner that by moving the globe in one direction it comes in the proper position to receive the lubricating material, and by moving it in the opposite direction it comes in the position to discharge said lubricating material into the cylinder or other part to be oiled.]

44,298.—Chasing Mill.—Wm. M. Force, Newark, N. J. Ante-dated June 6, 1864:

I claim arranging a heating bed outside of and around the grinding bed of a chasing mill, to receive and heat the materials ground and prepare them for pressing, or the next operation.

And in combination with the heating bed arranged around the grinding bed of a chasing mill, I claim the cover, K, of the heating bed, for the purpose set forth substantially as described.

44,299.—Medicine for the Cure of Diptheria, etc.—Thomas J. Glines, Hebron, N. Y. Ante-dated Sept. 10, 1864:

I claim the combination of the medicinal powers of serpentaria in the treatment of disease, in the manner herein described, with muriatic acid and chlorate of potash.

44,300.—Feather Edging Machine.—Louis Goddu, Braintree, Mass.:

I claim in connection with feeding and cutting mechanism and a guilding surface, the employment of a directing rod or point to keep the stock against the grinding surface.

I also claim the construction of the lower feed-roll, with dinking points so arranged as to puncture and space the holes for the peg points, substantially as described.

I also claim the arrangement of the mechanism by which, while the knife is operating has a fixed relation to the surface of the lower feed-roll, the directing rod and upper feed roll yield to the inequalities of the stock.

Also the construction by which the knife and upper feed roll are raised, lowered, and fixed in position together, substantially as set forth.

I also claim combining a horizontal skiving knife with inclined surface feed rolls, in the manner and for the purpose substantially as set forth.

(44,301 Suspended.)

44,302.—Water Wheel.—George Gross, Buffalo, N. Y.:

I claim, first, The arrangement and combination of the hollow perforated and vertical shaft, with its collar, P, and its cavity at the lower end filled with babbit or other metal, its adjustable socket, K, oil tube and sleeves, X, and mill stones at top of shaft, when arranged and combined as herein described and for the purposes set forth.

Second, I also claim the construction and combination of the adjustable socket, K, with its box, H, as described and for the purposes set forth.

Third, I also claim the incline projection, f, on the inside of the scroll, for the purpose specified.

Fourth, I also claim the angular construction of the bucket, b, of the wheel, as herein described.

44,303.—Combined Sword-handle and Revolving Fire-arm.—Sive Guilbert, New York City:

I claim, first, Using the guard, G, of the saber, for the spring, which acts on the hammer, E, as specified.

Second, The trigger, H, guard, G, and hammer, E, arranged in combination with each other, and with the perforated hilt, A, and revolving cylinder, D, in the manner and for the purpose substantially as described.

Third, The hook, l, which catches in the chambers of the cylinder and acts in combination with the trigger, H, substantially in the manner and for the purpose herein set forth.

[This invention consists in the application of a revolving-chambered cylinder to the rearend of the hilt of a saber, in combination with a hole bored through said hilt, and corresponding in size to the chamber in the cylinder, in such a manner that by revolving said cylinder one of the chambers after the other can be brought in line with the hole in the hilt, which takes the place of the barrels, and said hilt forms a regular revolver.]

44,304.—Scroll Sawing Machines.—Andrew Hanauer. Covington, Ky.:

I claim, first, The two levers, C I, in combination wiih the two saws, P P, and connecting rods, M S, and slides, N Q, arranged to operate in the manner substantially as and for the purpose herein set forth.

Second, The adjusting of the upper lever, I, through the medium of the cams, J J, for the purpose of straining the saws, as herein specified.

Third, The tnbular pitman. V, provided with fibrous or absorbent filling, b, for the purpose herein set forth.

[This i vention consists in the employment or use of two levers, connected by rods and saws, the levers working on central fulcrum pins, and one of the levers having its fulcrnm pin fitted in adjustable boxes, so that said levers, by means of certain mechanism, may be adjusted to strain the saws. This invention also consists in a peculiarity of the construction of the pitman, which communicates motion to ths saws, by which construction the journals on which the pitman is fitted may always be kept in a properly lubricated state. The invention further consists in the employment or use of adjustable saw guides, arranged and applied in a novel way, so as to be capable of being readily adjusted, as required.]

44,305.—Beehives.—William Harden, Chariton, Iowa:

I claim a bee house or bee palace, provided with a series of compartments in front, having slides, g, in which openings, h, are made covered with wire cloth; in connection with a series of hives, A, placed together or fitted within the house or palace provided with spare honey-boxes, C, the front ends of which are above the board or cover, e, of the compartments, and are fully exposed for their ready removal from and insertion within the house or palace, sub tantially as herein set forth.

[This invention relates to a new and improved bee house or bee palace, and is designed to prevent the swarming of bees, and also to protect them from the moth, as well as to afford facilities for feeding the bees and removing the spare honey from the house or palace.]

44,306.—Farm Gate.—W. D. Harrah, Davenport, Iowa:

I claim, first, The slot, b, located as described, for the purpose set forth.

Second, The extension, c3, aiding to sustain the weight of the gate and relieve the pin, f, as set forth.

Third, The bevels, a' a', on the parts, a a, of the post, for the purpose described.

44,307.—Stoves.—John R. Hawkins, Syracuse, N. Y.:

I claim the division of the space within the outer shell of the stove into the different compartments, by the partitions, Z Z' Z'', and P P', as above-described, in combination with the firepot grate, coal reservoir and outer shell, as above described.

Second, The fire-pot made circular at the bottom and elliptical at the top, in combiuation with the grate and coal-reservoir, as above described.

Third, The combination of a grate, made in the form of a pyramid, with bars and a toothed edge, and a bed-plate, having the edge of the opening in which the grate is placed, also toothed as above described, in connection with the fire-pot and coal receivers, as above described.

44,308.—Manufactuae of Stamped Ware.—G. H. Hazelton, Philadelphia, Pa.:

I claim coating stamped ware made of tinned iron, substantially as and for the purpose herein set forth and described

34,309.—Manufacture of Wash-boilers and otner vessels.—G. H. Hazelton, Philadelphia, Pa.:

I claim the manufacture and use of bottoms for wash-boilers and other similar vessels, made of the material, and substantially as herein set forth and described.

44,310.—Process for Tempering Steel.—William Hazen, Milwaukee, Wis.:

I claim the process as above described.

44,311.—Adjustable Percolator.—J. Q. Hill, Worcester, Mass.:

I claim, first, The combination of a supporting rim or part, B, with adjustable or flexible flanges, b, and a perforated diaphragm, substantially as and for the purposes set forth.

Second, The combination of the supporting part, B, with a series of flanged supports, for the purposes set forth.

44,312.—Breech-loading Fire-arms.—W. D. Hillis, Joliet, Ill. Antedated Sept. 16, 1864:

In combination with the lever, F F2 f', sliding leg, G, ways, g, and spring, F', I claim the projection, H, provided with the niche, h, when arranged in the manner and for the purpose described.

44,313.—Clothes-wringing Machine.—R. B. Higunin, Cleveland, Ohio:

I claim the sectional shafts, A A, substantially as and for the purposes specified.

I also claim the sheets, B B, adjusted substantially as and for the purposes specified.

44,314.—Extracting Rosin and other substances from Pine Wood.—Duane Hull, Newburgh, N. Y.:

I claim the art of producing rosin direct from pine wood by the application of heated air or super-heated steam, as above described, and the improved mode of producing spirits of turpentine by means of hot air or super-heated steam, as above described.

44,315.—Water Elevators.—George Illias, Dallastown, Pa.:

I claim, first, The movable platform, B, constructed substantially as shown, in combination with the flooring of the main platform, E, substantially as described.

Second, I also claim the combination of the double buckets, the chain and sprockett wheel, the forked rod, b, the trough, C, ratchet with double detents, and the driving shaft, substantially as described.

Third, I further claim the combination of the movable platform with the devices in the claim next preceding, substantially as described.

[The invention combines a movable platform with the main platform of the well, so as to cover the well-hole, without interfering with the chain, and also improves the operating parts of the apparatus, by a new arrangement of various devices.]

44,316.—Paint Oil.—Wm. Johnson, Allegheny City, Pa.:

I claim as a new article of manufacture a paint oil, composed of the ingredients and mixed in the proportions herein specified.

44,317.—Escapements for Chronometers.—Jacob Karr, Washington, D. C.:

I claim the construction of an escapement lever, as is shown in figures 1 2 3 4 and 5, in its combination, as designated by the letters A B C D E F G H L M and S, for the uses and purposes herein described.

44,318.—Machine for Cutting Leather into Counters.—Aberdeen Keith, North Bridgewater, Mass.:

I claim for splitting leather into counters or like articles the combination of the tapering feed-rollers with the cutting-knife, arranged with them as specified, the said tapering rollers causing the knife to cut in a curved path.

And, in combination with the feed-rollers and the knife, I claim a mechanism for adjusting, in manner substantially as and for the purpose described, the declination of the knife in accordance with the variation of the distance between the feed-rollers such mechanism as explained, being the movable standard, its weighted lever and knife-supporting bracket, the whole being connected with the lower feed-roller shaft, as set forth.

44,319.—Connecting Rotary into Reciprocating Motion.—A. E. Kline, Goodville, Pa.:

I claim the guard, e' e2, applied to the pins, d' d2, and operating in combination with the arms, a' a2, of the yoke, attached to the disk or plate, A, substantially as and for the purpose herein set forth.

[This invention relates to that kind of device for converting rotary into reciprocating motion, and vice versa, which is composed principally of a rotating disk or plate, containing two straight slats crossing its center at right angles to each other, and a reciprocating rod or pitman, furnished with two pins working in the said slots.]

44,320.—Mode of Separating Gold and Silver from Ores.—Matthew Laflin, Chicago, Ill.:

I claim separating gold or silver from quartz or other substances, by means of molten lead or its equivalent, under a mode of operation substantially as above set forth.

44,321.—Linch Pins.—Thomas Laly, Philadelphia, Pa.:

I claim the combination of the linch pin, its recess or opening, X, and loose dog, b, the whole being arranged and operating as and for the purpose set forth.

44,322.—Steaming Grain in Process of Grinding.—Jas. F. Lawton, Venedy, Ill.:

I claim treating grain preparatory to grinding by subjecting it to an immersion, in an atmosphere of free steam, substantially as shown.

44,323.—Medical Compound.—Jacob Leich, Brooklyn, E. D., N. Y.:

I claim the use of a compound made of the ingredients above-specified, mixed together in about the proportion and substantially in the manner set forth.

[The object of this invention is a compound, which, by several years' practice, has been found to be a sure remedy for consumption, to be used by persons of both sexes, and by children as well as grown persons.]

44,324.—Fruit-drying Oven.—David Lippy and Samuel Linn, Mansfield, Ohio:

We claim the oven, C, provided with the flues, G, and shelves or drawers, K, when used in connection with the chamber B, fire-box, A, pipe, F, and drum, D, arranged substantially as and for the purpose herein set forth.

We further claim the registers, a b H and I, when applied respectively to the chamber, B, flues, G, and oven, C, substantially as and for the purpose set forth.

[The object of this invention is to obtain a device by which fruit may be dried with rapidity and in a thorough manner, and to this end the invention consists in providing an oven with a series of flues and registers and arranging the same with the fire-box and a device, in such a manner that the fruit which is placed in drawers or on shelves within the oven will be exposed to the requisite degree of heat to expel moisture from them and due provision made for the escape of the moisture.]

44,325.—Governors.—Peter Louis, New York City:

I claim, first, The rod, A, and spring, C, or their equivalents, in combination with the fly-wheel, D, constructed and operating substantially as and for the purpose herein shown and described.

Second, The bell crank, k', slotted and curved as described, in combination with the dog or its equivalent, and arranged so as to give a forward motion to the dog at each stroke, in or out of the piston.

44,326.—Manufacture of Stop Cocks.—Joseph L. Lowry, Pittsbargh, Pa.:

I claim constructing the valve, valve seat and lifting screws of stop cocks, in the manner and by processes and means, substantially as described.

44,327.—Steam Engines.—Joseph L. Lowry, Pittsburgh, Pa.:

I claim, first, The combination herein described for utilizing or revoking the steam or vapor of a pumping engine, after having been used for lifting the piston with its weight to the top of the cylinder or the full length of the upward stroke, by passing it into the other end of the cylinder so as to act on the opposite side of the piston, and assist by the force of expansion to drive in connection with the weight the water through the main pipe to its place of destination.

I also claim the combination of the valves marked O and T and d and c, for the purpose herein set forth and described.

I also claim so constructing the condenser of a pumping engine in connection with the main pipe, as that all the water operated on by the pump shall either be forced around or drawn through it, for the purpose of condensing the steam rapidly, however great the quantity.

44,328.—Seeding Machine.—Joseph Lyle, Clarksville, Iowa:

I claim the combination of the inclined floor, a, apertures, d d, gate, P, and agitating device, J K L M N O, having curved teeth projecting from the outside into the hopper horizontally through the apertures, d d, and all constructed, arranged and operating in the manner and for the purposes herein specified.

[This invention consists in the employment or use of a series of agiators attached to a horizontal rod, which is connected to levers operated from a crank shaft, which receives its motion from one of the traction wheels of the machine. The agitators are rods, which work at the rear of the seed-box, and in the same through openings made in the back of the seed-box, the area or capactty of the openings being regulated by means of a slide.]

44,329.—House-warming Furnace.—Peter Martin, Cincinnati, Ohio:

I claim, first, The provision in an air-warming furnace of an exterior shell formed of corrugated metallic plates, A, in the described combination with the crown and bed plates, B and C, as described.

Secondly, The arrangement of warm air-chamber, D, inclosing the

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furnace proper, and provided with tubes, G, interior tubes, G', in the manner and for the object described.

Third, The sectional fire-pot, O o, formed and arranged in the manner and for the object stated.

Fourth, The arrangement of provisions, O o, P p p', Z, for converting a coal into a wood-burning furnace, and vice versa.

Fifth, The provision, K L L M N, for purifying the entering air, as set forth.

Sixth, The arrangement of tank, N, water supply and discharge pipes, Y Y', vapor pipes, v, and warm air tubes, W, as described.

Seventh, In this connection the provision of the direct exit pipe, G" for the object stated.

44,330.—Rotary Steam Engines.—T. G. Massie, Port Henry, N. Y.:

I claim, first, The cams, c c', on the inside surfaces of the cylinder heads, arranged in combination with the transversely-sliding piston, E, and piston wheel, D, constructed and operating in the manner and for the purpose substantially as shown and described.

Second, Making the sides of the piston concave, substantially as herein specified, to allow the steam to pass through the piston wheel and act on both sides of the piston.

Third, The roller frames, F, applied in combination with the piston, E, piston wheel, D, and cams, c c', substantially as and for the purpose herein shown and described.

Fourth, The doors, f*, in the sides of the cylinder, arranged in the manner and for the purpose set forth.

Fifth, The spring abutments or packing pieces, h h', applied to the apexes of the cams, c c', in the manner and for the purpose substantially as herein specified.

Sixth, The movable slats, e, applied in the sides of the piston, in combination with wedges, f, and spring, g, or their equivalents, constructed and operating substantially as and for the purpose set forth.

[An engraving and full description of this invention will be found in No. 7, Vol. XI., of the SCIENTIFIC AMERICAN.]

44,331.—Device for Cutting Glass.—A. S. McClure, New Buffalo, Pa.:

I claim my steel glass cutter as an article of manufacture as herein constructed and described and for the purpose set forth.

44,332.—Sewing Machine.—T. L. Melone, Granville, Ohio:

I claim, first, The main driving shaft, B, arranged vertically below the shuttle driver and near the raceway, and in relation to the needle arm and shuttle driver substantially as herein specified, the same containing thereon, and the whole cast in one piece, the band wheel, needle-operating cam, fly-wheel and feed cam, substantialy as herein specified.

Second, The employment for feeding the material to be sewed, of a feeding dog, attached to and receiving its forward and back movements from a reciprocating shuttle-race, substantially as and for the purpose herein specified.

[The principal object of this invention is to simplify and reduce the cost of the shuttle sewing machine. It consists in a novel construction and arrangement of the mechanism for operating the needle, the shuttle and the feeding device, whereby the number of the parts of the machine is reduced, its construction simplified, and the machine enabled to be driven with less power. It also consists in making the shuttle race and feed bar of one piece; or, in other words, in the employment for feeding the material to be served of a longitudinally-movable shuttle race, thereby reducing the number of parts of the machine.]

44,333.—Cutter Arms for Planing Machines.—Rufus N. Merian, Worcester, Mass.:

I claim the described method of fastening the cutters, substantially as and for the purpose herein specified.

44,334.—Water Elevators.—Jacob Negly, Fairview, Ill.:

I claim the combination of an endless chain of buckets, with a clock movement and with a receiver, l, constructed and operating in the manner and for the purpose substantially as herein shown and described.

[This invention consists in the combination with a clock movement of an endless chain of buckets descending into a well or reservoir containing water, and passing down in close proximity to a suitable receiver, in such a manner that by the action of said clock movement motion is imparted to the endless chain of buckets, causing the empty buckets to descend into the water, and when full to ascend and discharge their contents, in the receiving vessel, and that by these means a continuous raising of water from the well or reservoir is effected without requiring any labor or attention, except the occasional winding up of the clock.]

44,335.—Molds for Casting Steel Tires.—George Nimmo, Jersey City, N. J.:

I claim, first, The piece, B, with knobs, J, to hold the heat-resisting substance, operated in the manner and for the purpose specified.

Second, The gate, G, attached to A, in the manner and for the purpose specified.

44,336.—Combined Coal Scuttle and Ash Sifter.—Thomas Parker, Philadelphia, Pa.:

I claim the portion, A, with its sieve, D, and drawer, E, in combination with the portion, B, the whole being constructed and arranged substantially as and for the purpose herein set forth.

44,337.—Pumps.—Ely Perry, Baldwinsville, N. Y.:

I claim the combination of the wings, E, arms, E', and the flanges k k, arranged substantially as herein specified.

I also claim forming the under side of the wings with sharp edges, l l, the same being used in combination with the floor of the case, A, substantially as described.

44,338.—Axle Lubricators for Carriages.—Clark Polley, Scott, Ohio:

I claim the combination with the hub, A, of the cylinder, b, cap, c, screw spindle, e, piston, f, and feather, h, operating substantially as and for the purposes described.

[This invention consists in the employment or use of a cylinder inserted into the hub of a wheel and provided with a piston which is attached to a screw spindle screwing into a cap that closes the outer end of the cylinder in such a manner that by the action of the piston grease or lubricating material placed into the cylinder can gradually be forced down upon the axle and by the cap the escape of any part of said grease as the wheel turns, is effectually prevented. To prevent the piston from turning within the cylinder it is provided with a groove which works into a feather on the inside of the cylinder.]

44,339.—Braiding Guide for Sewing Machines.—John Ramsey, Pittsburgh, Pa.:

I claim forming a braiding guide for a sewing machine, by constructing the presser, A, with two or more slots to transverse to the line of feed, and with the guiding shoes, one of which is adjustable by means of the pinch screw, S, so that it can be arranged to suit braids of different widths, or used for ordinary sewing without further change or alteration, substantially in the manner as hereinbefore specified.

44,340.—Apparatus for steaming Oysters and preserving Fruit.—Joseph F. Reeves, Jr., Baltimore, Md.:

In combination with a water-tight car, fitted for steaming oysters and processing or preserving fruit and vegetables, I claim the railtrack on which it runs to and from the boiler, which supplies the steam to heat it.

44,341.—Device for destroying Insects and Vermin.—Peter Reynard and Victor Varin, New-York City:

We claim the blowing apparatus near the hand of the operator, with the vessel containing the powder by means of a tube or air conductor, as and for the purposes specified.

44,342.—Preparing Peat for Fuel.—N. C. Sawyer, Boston, Mass.:

I claim cornering or grooving blocks or bricks of peat, substantially as and for the purpose described.

44,343.—Apparatus for amalgamating Gold and Silver.—H. H. Scoville and P. W. Gates, Chicago, Ill.:

We claim, first, The employment of a scroll or its equivalent in the process of separating metals from their mineral matrix, substantially as described.

Second, A scroll (having one or more mouths) arranged within a cylinder, in combination with a reservoir for receiving the substances discharged from said scroll, substantially as described.

Third, The employment of a separator, E E', or its equivalent, in combination with a scroll, substantially as described.

44,344.—Horse Rake.—Frederick Seidle, Mechanicsburg, Va.

I claim the arrangement of bar, F, connected to the axle, A, by joints or hinges as shown, in combination with the teeth, E, fitted on the shaft, D, and connected to the bar, F, by springs, b, and the lever, G, all arranged to operate substantially as and for the purpose specified.

[This invention relates to a new and improved Horse Rake of that class which are provided with wire teeth, and it consists in a novel and improved manner of arranging and applying the same to the rake, whereby the construction of the same is much simplified, and the teeth made to operate in a perfect manner, and also be capable of being adjusted higher or lower as may be desired.]

44,345.—Base Burning Stove.—S. B. Sexton, Baltimore, Md.:

I claim, first, The combination of a suspended or coal supply magazine, a combustion chamber, a base burning surface, and a hot air chamber around the ash pit, substantially as and for the purpose set forth.

Second, The chamber, f f, and a space or spaces at the margin of the base burning surface, substantially in the manner and for the purpose described.

Third, The damper, j, in combination with the chamber, f f, and space at the margin of the grate, substantially as and for the purpose set forth.

Fourth, The door, l, in combination with the chamber, f f, and extended base burning surface, with a space around its margin, substantially in the manner and for the purpose described.

Fifth, In a stove where the coal is burned and allowed to flow freely out to the wall of the combustion chamber on a shallow base burning surface, I claim providing for the heating of the lower part of the stove, applying a counter draft, and preventing the flying of the ashes into the room, all substantially in the manner and for the purpose described.

Sixth, The construction of the coal supply magazine in two parts, so that the fire brick or other material shall be confined within and between said parts, substantially in the manner and for the purpose described.

44,346.—Frying Pan.—S. B. Sexton, Baltimore, Md.:

I claim, first, So constructing a vessel of the character herein described, that, when in use, a current or currents of external air will be conducted through it, by the natural draft of the stove, in such manner as to carry off the fumes arising in said vessel, substantially as described.

Second, Providing a culinary vessel with a flue or flues, B, through its bottom, and also with a perforated cover, C, or the equivalent thereof, substantially as described.

Third, A frying pan constructed with a flue, B, through its bottom, substantially as described and shown.

44,347.—Gauge Cock.—Samuel Shepherd, Nashua, N.H.:

I claim, first, The valve, C, movable nozzle or teat, E, and spring, d, in combination with each other, and with the shell A B, and lever, G, substantially as and wherein specified.

Second, The india-rubber or other soft packing, applied in combination with the movable nozzle or teat, E, chamber, B, and valve seat, c, substantially as and for the purpose herein described.

44,348.—Parlor Cooking Stove.—Joseph Simpson, Newark, Ohio:

I claim having the hinge loops made movable, in the manner and for the purpose substantially as herein shown and described.

I also claim the combination of the dampers, I J, with the flues, G G' G", oven, F, and fire chamber, D, in the manner and for the purpose herein shown and described.

44,349.—Ventilator for Ships.—Charles Sinclair, New-York City:

I claim the ventilator, C, provided with rigid lugs, a d, and adjustable lugs, b b, and operating in combination with the porthole, B, of a vessel, in the manner and for the purpose substantially as herein shown and described.

44,350.—Sad-iron Heater.—Walter F. Smith, Greenpoint, N. Y.:

I claim a sad-iron heater, constructed as herein described, as a new article of manufacture.

Also the angular fire grate, C, in combination with the draught hole, D, and top plate, E, with holes, c d, constructed and operating in the manner and for the purpose substantially as shown and described.

44,351.—Gang Plow.—John Stone, Plattsburg, Mo.:

First, In combination with the levers, E, and plows, I, I claim the catches, F, constructed, arranged, and operating substantially as and for the purposes herein set forth.

Second, I claim the standards, D', which support the seat, in combination with the levers, E, and catches, F, the same being arranged substantially as and for the purposes set forth.

44,352.—Last Block Fastening.—A. J. Tewksbury, Haverhill, Mass.:

I claim the dove-tail joint, A and C, in combination with the screw, f, which acts as a hinge, substantially as set forth and for the purpose specified.

44,353.—Explosive Shell.—B. H. Tripp, Culpepper, Va.:

I claim, first, The central barrel, B, breech plug, D, and time fuse, b, in combination with an explosive projectile constructed substantially as described.

Second, The combination of percussion exploder, g, time fuse, b, and communication, e, with a central discharge projectile, which is constructed with a central barrel, B, chamber, C, casing, A, and breech-plug, D, substantially as described.

44,354.—Mode of carrying Knapsacks.—Thomas Seaville Truss, London, England.

I claim, first, The construction of levers, forked, branched, or otherwise so formed as to pass over and rest upon the shoulders, and lying as close to the body as convenient, for the purpose of carrying knapsacks or other articles, substantially as described.

Second, I claim the making of the lever, A B C, in two or more parts, for the purpose of regulating the length thereof, substantially as described.

Third, I claim the combination of the lever, A B C, shoulder plates, b, knapsack, d, and waist belt, E, arranged and operating substantially as described.

44,355.—Corn Planter.—Henry Upjohn, Richland, Mich.:

I claim the combination of the cam, j, the bar, g, the lever, k, the slides, f f f f, and the jointed beam, a, the whole constructed and arranged substantially as herein set forth.

44,356.—Breech-loading Ordnance.—William Wallace, Ansonia, Conn. Ante-dated June 3, 1862:

I claim the employment of a removable sliding breech, A A, with a series of chambers, E E, and center bore, S, and the spring compensation as described, in combination with the breech strap with its hole, u, and the barrel, N, the whole constructed and operating as described for the purposes set forth.

44,357.—Corn Planter.—Henry W. Wansbrough and Henry M. Diggins, Cincinnati, Ohio:

We claim, first, The combination of the hollow drill tooth, E, guard, F, hopper, N, and slide, G, operating substantially as herein set forth.

Second, The provision of the yielding cut-off, H, applied and operating as set forth.

Third, The arrangement of ground wheel, I, rod, K, lever, L, spring, M, and cut-off, H, in the described combination with the grain slide, G, near the bottom of a hollow drill tooth, substantially as set forth.

44,358.—Hydraulic Jack.—Thomas H. Watson, New-York City:

I claim the fluid reservoir on the upper or front side of the head when in a horizontal position, as described, and for the purposes set forth.

44,359.—Sawing Machines.—W. J. Wells, Delaware, Ohio:

I claim, first, The combination of the screw, I, and swinging nut, H, with the saw-frame, C, for feeding or retracting the saw, as described.

Second, In combination with the aforesaid screw, I, swinging nut, H, and saw-frame, C, I claim the shaft, L, wheels, K S, pulleys, M O, and belts, P N, all arranged and operating as and for the purposes specified.

[This invention relates to a new and improved machine for sawing wood or logs transversely with the grain, and is designed for sawing wood for fuel, and into pieces of requisite lengths for wheel hubs, spokes, and other articles. The invention consists in the employment or use of a circular saw arranged in such a manner as to have a rising and falling movement, and used in connection with a log or timber-feeding mechanism, whereby the machine is placed fully under the control of the operator, and rendered capable of working in a perfect manner for the desired purpose.]

44,360.—Snow Plows.—Jeremiah B. Williams, Madison, Wis.:

First, I claim the digging or excavating wheel, O, having its wings attached in line with its axis, and having the outer edges of said wings formed scoop-shaped or curved as shown.

Second, I claim the wheel, C, in combination with the plow, B, constructed and operating substantially as set forth.

Third, I claim pivoting the plow, B, in such a way that it can be raised or lowered by means of the lever, h, and rod, I, substantially as shown.

44,361.—Safety Brakes for Railroad Cars.—Frederick Wolf, Philadelphia, Pa.:

I claim, first, A self-acting shoe, hung upon a stud or roller, working in a grooved or slotted plate, as shown and described for the purpose set forth.

Second, I claim supporting the frame, B, (to which are attached the ground or slotted guide plates, D), by the axles of the car wheels, as and for the purpose specified.

44,362.—Fusible Metal for filling Teeth.—Barnabas Wood, Albany, N. Y. Ante-dated Sept. 4, 1864:

I claim the herein described metallic composition for filling or repairing teeth, consisting of the ingredients specified in the proportion thereof substantially as set forth, or proportions equivalent thereto, as indicated, so as to produce a metal as described for said purpose.

44,363.—Revolving Firearm.—S. W. Wood, Cornwall, N. Y.:

I claim loading the cartridges into the chambers of the cylinder and expelling the empty cartridge cases therefrom when the said chambers are in line with the hammer, or in the same position as when the discharge takes place.

I also claim expelling the empty cartridge cases by the blows of the hammer, substantially as herein specified.

I also claim turning the barrel aside from its discharge position, in combination with a front loading cylinder, for the purpose of enabling the cartridges to be inserted into, and the empty cartridge cases to be expelled from, the chambers when in line with the hammer, substantially as herein set forth.

44,364.—Clasp for Tobacco Boxes, etc., etc.—Charles C. Ashley, Brooklyn, N. Y., assignor to James L. Harlem, of the same place:

I claim a clasp for tobacco boxes, spectacle cases, etc., formed in the manner described and shown.

44,365.—Knitting Machine.—Charles W. Blakeslee, Northfield, Conn., assignor to Nathaniel Wheeler, Bridgeport, Conn.:

I claim, first, The employment in a circular knitting machine of separately moving sinkers, so applied in combination with the adjustable needles as to provide for their being brought severally nearer to or further from the center of the machine, substantially as herein specified, for the purpose of widening or narrowing, as set forth.

Second, Fitting the needles into grooves in the shanks of the sinkers, substantially as and for the purpose herein specified.

Third, The grooved sinker adjuster, C, applied to operate substantially as and for the purpose herein described, in combination with projections, g, on the sinkers.

Fourth, So combining the needle operating cam, the sinker adjuster, the yarn conductor, the rotary burr, that all are adjustable toward or from the center of the machine, substantially as herein set forth.

44,366.—Boiler Furnaces.—Thomas B. Davis, Boston, Mass., assignor to Stephen G. Taylor, of the same place:

I claim in combination with an ash pit of a steam boiler furnace constructed with doors to open in the usual manner, the passage, f, and steam coil, g, operating together in the manner and for the purpose substantially as set forth.

44,367.—Machine for scraping Chairs and other articles.—Erastus S. French, Hubbardston, Mass., assignor to himself and Luke Sawyer, of the same place:

I claim the machine as consisting of the movable carriage, its scraper and pressure roller, and the fixed or stationary rest, as arranged and applied together, and to the frame, A, substantially as described, and having mechanism for imparting to the carriage reciprocating motions in manner as specified.

And I also claim the combination of the rocker bar, O, with the pressure roller, its springs, boxes, and carrying frame, when combined with the movable carriage or platform, its scraper, and the stationary rest, substantially in manner and so as to operate as explained.

44,368.—Fish Hooks.—Nathan A. Gardiner, Jr., Willett, N. Y., assignor to himself and Joseph Briggs, New-York City:

I claim the combination of a pair of bearded hooks, attached to or forming part of a coil wire spring, c, and provided with eyes, e, and f, and a rod, b, (having a line eye, d,) for setting and releasing the hooks, whereby I am enabled to make a cheap, simple, and effectual spring hook, the whole constructed and operating substantially as described and set forth.

44,369.—Machine for making Cement Pipe.—Humphrey Holden, New-Haven, Conn., assignor to himself and Wm. Goodwin, of the same place:

I claim the combination of one or more rolls with a case and core when constructed and arranged to operate substantially as herein set forth.

44,370.—Process of preparing Chrome Vermillion.—Joseph Huber (assignor to Huber, Heppe & Co.), New York City. Ante-dated Sept. 16, 1864:

I claim a paint produced by mixing white lead and bi-chromate of potash together, about in the proportion herein set forth, and treating it substantially in the manner specified.

[The object of this invention is to produce a paint similar to the Chinese or Japanese vermillion, of equal or better quality, and at a price much lower than the usual price of said foreign paint.]

44,371.—Water Elevator.—Samuel F. Jones, St. Paul, Minn., assignor to Erastus L. Floyd:

I claim, first, The sliding spout, B, pin, m, and bucket, D, arranged substantially as described.

Second, I claim in combination therewith the lever, E, substantially as described.

Third, Operating a discharge valve in a well bucket by thrusting a trough laterally beneath the said bucket to elevate the said valve, substantially as shown and described.

44,372.—Gas Stove.—Edwin A. Leland (assignor to Henry Perrie), New York City:

I claim, first, The construction of that part of the stove over the gas burners of two plates, c and d, with a space, d, between them, the upper plate, c, having holes provided in it for the boilers or other utensils, and the lower one having corresponding or opposite holes for the concentration of the products of combustion under and around the bottoms of the said utensils, and the space, b, between them serving to temporarily confine the products of combustion under the cooking utensils, and convey them to the flue provided for the purpose, substantially as herein described.

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Second, The descending flue, D, in combination with the said plates, c d, the space, b, the box, B, containing the gas burners, and the oven, C, substantially as and for the purpose herein described.

44,373.—Row or Scull Lock.—Joseph W. Norcross, Boston, Mass., assignor to W. W. Wilcox and Joseph Hall, Jr., Middletown, Conn.:

I claim the movable or yielding jaw, b, with the retaining spring, C, applied in combination with the universal joint and with the oar, in the manner and for the purpose substantially as herein shown and described.

[This invention consists in the combination with the oar and row or scull lock of a universal joint arranged in such a manner that the oar is prevented from being thrown out of the row lock by the force of the sea or by any other accident, and yet it can be moved freely in either direction; it consists further in the application of one or two movable or yielding jaws in combination with the universal joint and bar in such a manner that the oar can be instantly shipped or unshipped, as circumstances may dictate.]

44,374.—Thresher and Separator.—Samuel Pelton, Trenton, N. J., assignor to Fell, Pelton, & Brearley:

I claim, first, The combination of two straw shakers, E E', suspended by hangers, a1 a2, and moved simultaneously in opposite directions by a double crank shaft and pitman rods, substantially as and for the purpose set forth.

Second, I claim the combination of the shaker, E', and grain board, G', having a combined vertical and longitudinal motion, so as to toss the straw one way and grain the other, substantially as explained.

Third, I claim the automatic blast regulator consisting of valves, K2 k6 k6, pivoted rod, k2, and weights, k3 k4, the whole being arranged to operate substantially as and for the purpose explained.

44,375.—Spring Mattrass.—R. Stillwell (assignor to himself and Alexander D. Farrell), New York City:

I claim constructing the mattress frame in five sections, of which, when folded, the central one forms the lower section, the adjacent sections, d and f, the sides, and the end sections, c and g, the top, so as to allow the ends to be hooked together and the mattress to assume a rectangular shape, for convenience in packing away or for transportation.

Also the combination of the breaks, c d e f g, with the lips, l, of the hinges, h, constructed and operating in the manner and for the purpose substantially as set forth.

[The object of this invention is to produce a spring mattress, with stuffing, which can be conveniently folded to reduce it to a convenient size for packing, and to make the breaks in the mattrass so that the center of the bed retains its full strength, and the stuffing at that part of the mattrass is not affected by the folding, and at the same time the head piece can be raised to a convenient inclination.]

44,376.—Atmospheric Railway.—Alexander Allison and James Halliwell, London, Great Britain:

We claim, first, The valve, a, whether employed for railway or other purposes, and when used in combination with the chamber, w, or without said chamber, constructed substantially as described.

Second, The curved bar, e, for removing the valve, a, from the aperture, d, and returning the same after the passage of the piston rod, f, substantially as described.

Third, The elastic packing bands, j, when used on a piston head, for the purpose and substantially in the manner specified.

Fourth, The cone valve, H, whether used in a solid piston head or in combination with the elastic band, j, constructed and arranged for the purpose and substantially in the manner specified.

Fifth, The device for operating the cone valve, H, constructed and arranged substantially in the manner specified.

Sixth, The frame, f, with guide rollers, s, so arranged with reference to the bottom of the carriage, P, as to allow the piston, D, to follow the dip of the tube at the crossings, and to prevent any vertical motion of the carriage affecting the said piston.

Seventh, The frame, I, with guide rollers, r, so arranged with reference to the frame, P, as to prevent the oscillation of the carriage, P, being communicated to the piston, D.

Eighth, The branching of the tube, A, at N, Fig. 5, and the branching of the aperture, d, at y, in connection with the dip of said tube for the purpose of conveniently shunting the train or passing from one line of rails to another.

RE-ISSUES.

1,769.—Harvester.—Robert Brown, Newark, Ohio. Patented June 18, 4861:

I claim rigidly connecting the rake frame which is supported on the main frame of the machine, with the hinged finger beam in such a manner that the rake shaft does not change its relative position to said finger beam when the latter is raised or lowered in passing over uneven ground, substantially in the manner and for the purposes herein set forth.

I also claim securing both the finger-bar and rake frame to a hollow shaft, L, the journals, l, of which run in bearings, M, in the main frame and themselves constitute bearings for the journals, h, of the crank shaft, as herein shown and described and for the purposes set forth.

I also claim the reel attachments, o m p, constructed, combined and arranged in the manner specified to enable the attachment of any desired number of arms

1,770.—Grain and Grass Harvester.—J. Russell Parsons, Hoosick Falls, N. Y., assignee of Benjamin T. Rouey, Bristol. Patented March 11, 1856:

I claim, first, The gear or main frame in combination with the movable or cutter frame, by means of lugs and beveled projections, the whole being arranged and constructed substantially in the manner and for the purposes set forth.

Second, In combination with a master guard tooth or shoe of a cutting apparatus, which is free to conform itself both longitudinally and laterally to the undulations of the ground, a roller located in reference to the cutters, and operating substantially as described.

Third, Combining a supplementary frame supporting an endless belt and a cutting apparatus which conforms itself to the surface of the ground, with wheels supporting it and actuating a belt, as described.

DESIGNS.

1,987.—Pump.—George Cowing, Seneca Falls, N. Y.:

1,988.—Aquarium of Fish Tank.—George T. Palmer, Brooklyn, N. Y.:

1,989.—Skate.—Robert S. Stenton, West Farms, N. Y.:

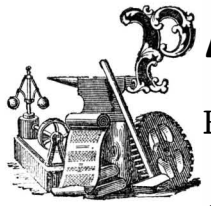
1,990.—Ruffle.—Samuel Trischet, New York City:

Binding the "Scientific American."

It is important that all works of reference should be well bound The Scientific American being the only publication in the country which records the doings of the United States Patent Office, it is preserved by a large class of its patrons, lawyers and others, for reference. Some complaints have been made that our past mode of binding in cloth is not serviceable, and a wish has been expressed that we would adopt the style of binding used on the old series, *i. e.*, heavy board sides covered with marble paper, and morocco backs and corners.

Believing that the latter style of binding will better please a large portion of our readers, we commenced on the expiration of Volume VII., to bind the sheets sent to us for the purpose in heavy board sides, covered with marble paper and leather backs and corners.

The price of binding in the above style is 75 cents. We shall be unable hereafter to furnish covers to the trade, but will be happy to receive orders for binding at the publication office, No. 37 Park Row, New York



PATENTS

GRANTED

FOR SEVENTEEN YEARS!

MUNN & COMPANY,

In connection with the publication of the SCIENTIFIC AMERICAN, have acted as Solicitors and Attorneys for procuring "Letters Patent" for *new inventions* in the United States and in all foreign countries during the past *seventeen years*. Statistics show that nearly ONE-THIRD of all the applications made for patents in the United States are solicited through this office; while nearly THREE-FOURTHS of all the patents taken in foreign countries are procured through the same source. It is almost needless to add that, after *seventeen years'* experience in preparing specifications and drawings for the United States Patent Office the proprietors of the SCIENTIFIC AMERICAN are perfectly conversant with the preparation of applications in the best manner, and the transaction of all business before the Patent Office; but they take pleasure in presenting the annexed testimonials from the three last ex.Commissioners of Patents:

MESSRS. MUNN & CO.:—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the office, a marked degree of promptness, skill, and fidelity to the interests of your employers. Yours very truly,

CHAS. MASON.

Judge Mason was succeeded by that eminent patriot and statesman, Hon. Joseph Holt, whose administration of the Patent Office was so distinguished that, upon the death of Gov. Brown, he was appointed to the office of Postmaster-General of the United States. Soon after entering upon his new duties, in March, 1859, he addressed to us the following very gratifying letter:

MESSRS. MUNN & CO.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents, while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and I doubt not justly deserved) the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements.

Very respectfully, your obedient servant,

J. HOLT

Hon. Wm. D. Bishop, late Member of Congress from Connecticut, succeeded Mr. Holt as Commissioner of Patents. Upon resigning the office he wrote to us as follows:

MESSRS. MUNN & CO.:—It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency; and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully, your obedient servant,

WM. D. BISHOP.

THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent, free of charge. Address MUNN & CO., No. 37 Park Row, New York.

As an evidence of the confidence reposed in their Agency by inventors throughout the country, Messrs. MUNN & CO. would state that they have acted as agents for more than TWENTY THOUSAND inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of inventors and patentees, at home and abroad. Thousands of inventors for whom they have taken out patents have addressed to them most flattering testimonials for the services rendered them; and the wealth which has inured to the individuals whose patents were secured through this office, and afterwards illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! Messrs. MUNN & CO. would state that they never had a more efficient corps of Draughtsmen and Specification Writers than those employed at present in their extensive offices, and that they are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The service which Messrs. MUNN & CO. render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there; but is an opinion based upon what knowledge they may acquire of a similar invention from the records in their Home Office. But for a fee of $5, accompanied with a model, or drawing and description, they have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through the Branch Office of Messrs. MUNN & CO., corner of F. and Seventh streets, Washington, by experienced and competent persons. Many thousands of such examinations have been made through this office, and it is a very wise course for every inventor to pursue. Address MUNN & CO., No. 37 Park Row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention if susceptible of one; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the Government fees, by express. The express charge should be pre-paid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by a draft on New York, payable to the order of Messrs. MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row, New York.

Patents are now granted for SEVENTEEN years, and the Government fee required on filing an application for a patent is $15. Other changes in the fees are also made as follows:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

The Patent Laws, enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners, except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention The Government fee for a caveat is $10. A pamphlet of advice regarding applications for patents and caveats is furnished gratis, on application by mail. Address MUNN & CO., No. 37 Park Row, New York.

REJECTED APPLICATIONS.

Messrs. MUNN & CO. are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of their Washington Agency to the Patent Office affords them rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Their success in the prosecution of rejected cases has been very great. The principal portion of their charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted, are invited to correspond with MUNN & CO., on the subject giving a brief history of the case, inclosing the official letters, &c.

FOREIGN PATENTS.

Messrs. MUNN & CO., are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business they have offices at Nos. 66 Chancery lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. They think they can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through their agency.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through MUNN & CO'S Agency, the requirements of different Government Patent Offices, &c., may be had, gratis, upon application at the principal office, No. 37 Park Row, New York, or any of the branch offices.

SEARCHES OF THE RECORDS.

Having access to all the official records at Washington, pertaining to the sale and transfer of patents, MESSRS. MUNN & CO., are at all times ready to make examinations as to titles, ownership, or assignments of patents. Fees moderate.

INVITATION TO INVENTORS.

Inventors who come to New York should not fail to pay a visit to the extensive offices of MUNN & CO. They will find a large collection of models (several hundred) of various inventions, which will afford them much interest. The whole establishment is one of great interest to inventors, and is undoubtedly the most spacious and best arranged in the world.

MUNN & CO. wish it to be distinctly understood that they do not speculate or traffic in patents, under any circumstances; but that they devote their whole time and energies to the interests of their clients.

COPIES OF PATENT CLAIMS.

MESSRS. MUNN & CO., having access to all the patents granted since the rebuilding of the Patent Office, after the fire of 1836, can furnish the claims of any patent granted since that date, for $1.

THE VALIDITY OF PATENTS.

Persons who are about purchasing patent property, or patentees who are about erecting extensive works for manufacturing under their patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing patent, before making large investments. Written opinions on the validity of patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the invention and being informed of the points on which an opinion is solicited. For further particulars address MUNN & CO., No. 37 Park Row, New York.

EXTENSION OF PATENTS.

Many valuable patents are annually expiring which might readily be extended, and if extended, might prove the source of wealth to their fortunate possessors. Messrs. MUNN & CO. are persuaded that very many patents are suffered to expire without any effort at extension, owing to want of proper information on the part of the patentees, their relatives or assigns, as to the law and the mode of procedure in order to obtain a renewed grant. Some of the most valuable grants now existing are *extended patents*. Patentees, or, if deceased, their heirs, may apply for the extension of patents, but should give ninety days' notice of their intention.

Patents may be extended and preliminary advice obtained, by consulting or writing to MUNN & CO., No. 37 Park Row, New York.

ASSIGNMENTS OF PATENTS.

The assignment of patents, and agreements between patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Agency, No. 37 Park Row, New York.

UNCLAIMED MODELS.

Parties sending models to this office on which they decide not to apply for Letters Patent and which they wish preserved, will please to order them returned as early as possible. We cannot engage to retain models more than one year after their receipt, owing to their vast accumulation, and our lack of storage room. Parties, therefore, who wish to preserve their models should order them returned within one year after sending them to us, to insure their obtaining them. In case an application has been made for a patent the model is in deposit at the Patent office, and cannot be withdrawn.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid) should be addressed to MUNN & CO. No. 37 Park Row, New York.

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Notes and Queries

E. S., of Pa.—The best way to grind a slide valve is to scrape it, which is to say that it must not be ground. The grinding material gets in the pores of the metal and in the ports of the cylinder, and cannot be got out. In this way it soon destroys the piston packing and cylinder. Take a three square file and grind it sharp on the edges, and you will have a good scraper. To grind a poppet valve or a safety valve scrape it until it bears well all over, and then take a little pulverised pumice-stone and water or grind-stone, slush and cut down the high points.

L. W., of Mass.—$24 20 received. We are very greatly obliged for the substantial token of your appreciation which you send us in the shape of so large a list of subscribers. For the kind words of interest and encouragement which you so well express, you have our thanks. We shall in due time give attention to your suggestions. We do not remember any patent for the idea of revolving the wheels of a clock calendar by gravitation? But perhaps we do not fully understand your inquiry. Do you mean a self-operating mechanism, *i. e.*, a perpetual motion?

R. C. B., of Ill.—When the atmosphere rests on all parts of the surface of any vessel or pond of water, it has no tendency to raise any portion of the water. But if one end of a tube is placed in the water, and the air in the tube is taken out, so as to remove the pressure from that portion of the surface enclosed in the tube, then the weight of the atmosphere resting on the surface outside forces the water up into the tube. In the case of a pump the air in the tube is raised from off the surface of the water by the piston. If capillary attraction is due to atmospheric pressure, how is the pressure of the air taken from the surface of the liquid within the capillary tube?

W. H. W., of Conn.—To procure hydrogen gas, dilute 3 pounds of oil of vitriol with 24 pounds of water, and dissolve in it 2 pounds of zinc. All the apparatus required is an air-tight glass or lead vessel, with a pipe inserted air-tight in the top to carry off the gas. Navigating balloons will always be impracticable, for the reason that a balloon which will float an engine in the air must be too bulky to be moved with any but the most moderate velocity through the air. Fire shells have long been made far more efficient than Greek fire, or any other liquid.

H. W. S., of Ohio.—This correspondent says:—"On page 163 you have an account of a submarine boat building in England for Russia. I would ask when a vessel is sunk completely under water what means can be used to vary its buoyancy so minutely as to keep it at any particular distance between the surface or the water and the bottom of the river or ocean. It seems to me that a variation of so little as one ounce in a thousand pounds would sink or float it." We answer by taking in or expelling water.

W. S. A., of N. Y.—We are very much obliged to you for the formulæ you send to obtain the lengths of belts, but does it not strike you that in practice a mechanic could find the length quite as soon with a tape-line. So long as the distance between the centers has to be measured before the calculation is made, we might as well make one thing of it and find the actual length of the belt at the same time. We shall be glad to hear from you again.

E. R. C., of N. J.—Hilton's cement will fasten the metal bottom into your porcelain cup provided you do not wish to expose it to the action of heat. If it is to be exposed to heat you may use boiler-makers cement. This is made by mixing with white lead ground in oil as you buy it at the paint shops, red lead so as to make a paste like dough. It will harden in two weeks Use only just enough for the purpose.

C. P. R., of Ill.—Your criticism of the item "A crossed belt will drive more than a straight belt, because it hugs the pulley tighter," is perfectly correct. A crossed belt drives more than a straight belt, because it laps further round the pulley, and that is the interpretation which every intelligent mechanic would put upon the two lines in question. It is proper to be exact in all expressions, but terms are synonymous sometimes, in this case particularly.

C. T., of N. Y.—You can get a small quantity of magnesium wire for experiment of Professor Seely, 244 Canal street, this city, at fifty cents per foot. It may be set on fire with a match, when it burns rapidly with an exceedingly bright and beautiful flame. The product is of course magnesia, the oxide of magnesium.

W. J., of Pa.—In making varnish the gum is melted then hot linseed oil is poured in, and finally benzine is added Petroleum benzine is a very poor solvent of the gums used in making varnish and is apt to separate, but the coal tar benzine is nearly as good as spirits of turpentine.

J. McN., of C. W.—Hatfield's "American House Carpenter," published by John Wiley of this city in 1857, is a good work for you to have. We notice your remark about the Canadian patent law policy, and we sincerely hope that something may yet be done to secure such an amendment as will admit our citizens to equal protection.

W. J. C., of La.—There is no rule for finding the length of the link. It is simply an agent for connecting the two eccentric rods together, and an inch more or less makes no difference in its operation. It is made as light and as strong as possible, on account of the trouble of counterbalancing it.

A. T. D., of Maine.—Your plan of generating steam by throwing just enough water into a boiler or pipe for the capacity of the cylinder is very old. Paine's "Spray engine" was thus operated. There is no economy in it, and the heater or boiler if you choose to call it such, is destroyed quickly.

J. H. H., of Mass.—There are so many good breech-loading rifles using metallic cartridges, that it would be difficult to decide which one is the best. Look over the engravings of such devices the SCIENTIFIC AMERICAN, and make your own selection

G. B. P., of N. Y.—We are glad you are so highly pleased with the manner in which we have executed your patent business. You can get information as to metallic packing at any of the engine builders in your place.

T. C. B., of Conn.—An interesting illustrated article on die-sinking and multiplying will soon be published, and we refer you to it for the information you desire respecting this art.

P. M., of R. I.—Coculus Indicus is used to destroy or stupify fishes so that they can be taken with little trouble and in large quantities.

C. B. M., of N. J.—The difference between a cross-cut saw and a rip saw is that the teeth of the latter all lead one way, while those of the former are straight up and down, the first are equilateral triangles, while the latter are right-angled triangles.

J. R. W., of Mass.—There is a great difference in the efficiency of levers. In a first class lever the power moves faster than the work, which is a mechanical advantage. In the third class lever the work moves faster than the power, which is a disadvantage.

E. B. C., of Ohio.—We know of no journal devoted exclusively to telegraphing. The SCIENTIFIC AMERICAN aims to have everything new and interesting relating to the subject. We illustrate and describe all valuable improvements in any of the apparatus.

W. P. B., of Wis.—Morse & Bros., of Athol, Mass., were at one time engaged in making furnaces for burning wet tan bark You had better address them on the subject.

O. H. D., of Maine.—We shall be most happy to read your article on dry printing, and the results of your experience with the machinery in the treasury department.

J. S. Cummings, of Webster, Mass., wants to know if machinery suitable for the manufacture of linen thread can be procured in this country.

C. A. C., of Ind.—We are preparing a series of illustrated articles on the subject of lathe tools, which will appear in a short time.

C. M. R., of Va.—You can obtain galvanic batteries and all the information you desire of Messrs. Chester, 404 Center street, New York.

W. A. F., of Vt.—Address M. J. Cluff, No. 288 Washington street, Boston, Mass., in relation to clothes wringers.

T. B., of Ohio.—Knife blades can be fastened by a cement composed of shellac two parts, chalk one part. The hole in the handle is filled with this powder, the tang heated, pushed in and left standing on end.

Money Received

At the Scientific American Office, on account of Patent Office business, from Wednesday, Sept. 14, 1864, to Wednesday, Sept 21, 1864:—

C. A. H., of N. Y., $25; G. F. J. C., of N. J., $25; H. M., of N. Y., $20; F. & H., of N. Y., $120; J. McK., of N. Y., $45; W. G., of N. J., $20; W. B., of Ind., $20; A. M. O., of Ill., $75; S. W. P., of Ill., $20; B. M., of N. Y., $20; W. T., of N. Y., $35; D. H. B. A., of Vt., $20; C. & T., of Conn., $25; A. J. N., of R. I., $15; F. C. W., of Conn., $25; J. G., of Pa., $20; T. K., of Conn., $16; B. L. W., of Ill., $20; R. McC., of Ill., $15; J. S. W., of C. W., $36; T. N. D., of Ind., $35; W. N., of N. Y., $15; D. R., of Mich., $20; W. T., of Ill., $20; H. J. H., of N. Y., $66; W. F. Q., of Del., $20; J. A. McP., of N. Y., $30; S. G. R., of N. Y., $25; A. S. H., of N. Y., $25; A. W. H., of N. Y., $20; W. R. M., of N. Y., $20; V. H. H., of N. Y., $45; S. W., of Wis., $20; J. E. T., of Pa., $20; C. W. & J. P. W., of Ill., $20; W. A. B., of Vt., $56; J. N. C., of Ohio, $20; A. P., of N. Y., $45; W. J. L., of Mass., $20; J. W. B., of Mass., $12; I. C. P., of Ill., $15; G. W. M., of Mich., $25; H. F. W., of Mass., $30; N. D. H., of Conn., $30; S. C. T., of Mich., $16; C. C. B., of Iowa, $25; D. H. I., of Ill., $15; M. C. D., of Ohio, $15; G. F. M., of Ohio, $16; P. W., of Mich., $25; V. F., of Mass., $15; W. B M., of Mich., $25; G. K. W., of Conn., $30; J. H. F., of Ky., $52; C. J. H., of N. Y., $25; E. F. W., of N. Y., $25; M. H., of N. J., $40; F. G. S., of Mass., $20; B. & A., of Cal., $25; M. C., of Ohio, $20; McI. & M., of Mich., $20; J. B., of N. Y., $20; J. H. L., of N. Y., $40; T. B. G., of N. Y., $50; W. H. F., of Pa., $20; G. F., of Ill., $16; A. P., of Wis., $16; F. M. B., of Ky., $20; J. S., of N. Y., $16; A R., of N. Y., $787; G. W. B., of Ohio, $25; J. H. M., of Ohio, $16; J. & B., of N. Y., $450; H. W., of Wis., $35; O. B., of N. Y., $16; J. G. S., of Mass., $16; F. H. B., of Ill., $15; E. C., of N. Y., $25; L. M. H., of N. Y., $25.

Persons having remitted money to this office will please to examine the above list to see that their initials appear in it and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, stating the amount and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office, from Wednesday, Sept. 14, 1864, to Wednesday, Sept. 21, 1864:—

G. F. J. C., of N. J.; S. G. R., of N. Y.; E. F. W., of N. Y.; W. A. B., of Vt.; A. E. B., of Conn.; G. W. B., of Ohio; B. L. W., of Ill.; T. N. D., of Ind.; H. W., of Wis.; C. C. B., of Iowa; G. K. W., of Conn.; J. H. F., of Ky. (2 cases); C. J. H., of N. Y.; C. A. H., of Pa.; M. H., of N. J.; J. H. L., of N. Y.; J. W. B., of Mass.; P. W., of Mich.; F. C. W., of Conn.; W. B. M., of Mich.; H. F. W., of Mass.; W. F. Q., of Del.; L. M. H., of N. Y.; H. J. H., of N. Y.; A. S. H., of N. Y.; A. M. O., of Ill.; T. B. G., of N. Y.; G. W. M., of Mich.; C. & T., of Conn.; M. C. D., of Ohio; E. C., of N. Y.; J. McP., of N. Y.; G. C., of N. Y.

Back Numbers and Volumes of the "Scientific American."

VOLUMES III., IV., VII., IX AND X., (NEW SERIES) complete (bound) may be had at this office and from periodica dealers. Price, bound, $2 25 per volume, by mail, $3—which includes postage. Every mechanic, inventor or artisan in the United States should have a complete set of this publication for reference. Subscribers should not fail to preserve their numbers for binding VOLS. I., II., V., VI. and VIII. are out of print and cannot be supplied.

TO OUR READERS.

MODELS are required to accompany applications for Patents under the new law, the same as formerly, except on design patents, when two good drawings are all that are required to accompany the petition, specification and oath, except the Government fee.

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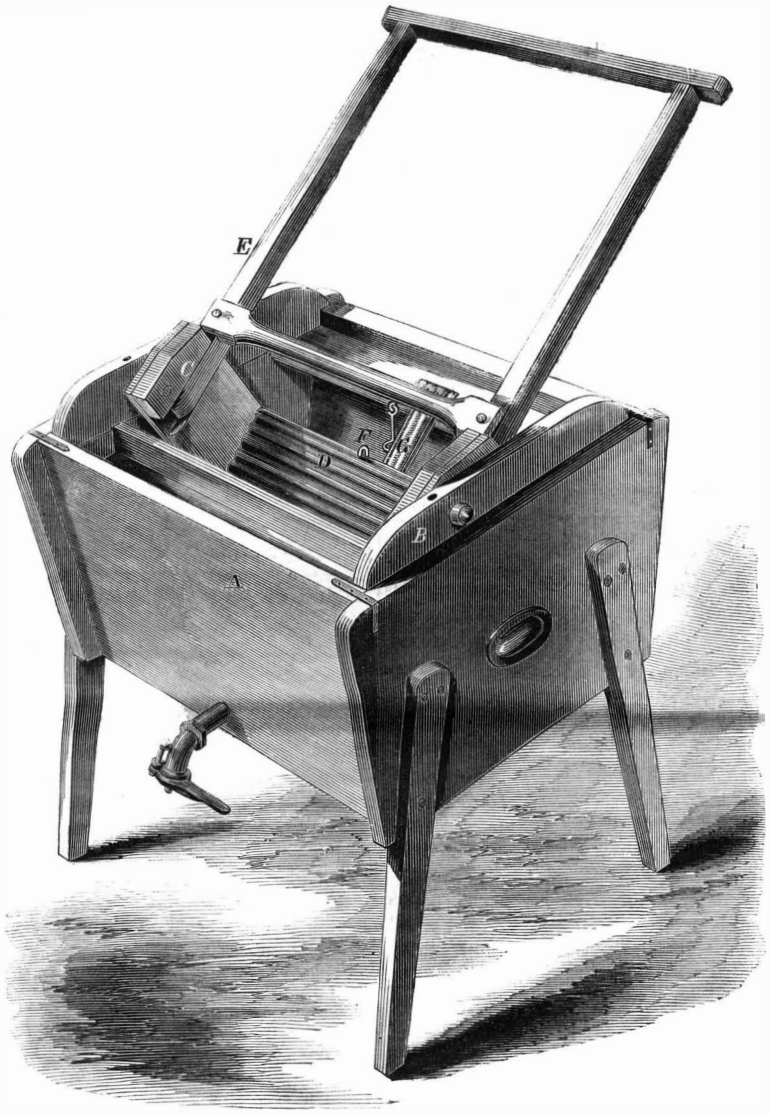

DOTY'S "PARAGON" WASHING MACHINE.

the bearings of the frame, C, work. The wash-board, D, is in form a common footstool turned upside down, this is attached to a pair of levers, E, in such a way that the action is very easy. The clothes are placed in the case, and by moving the levers up and down, as in pumping water, they are thoroughly rubbed, squeezed and lifted at each stroke, so that they are rinsed, shaken and as well worked over as the hand of a skillful wash-woman could do it. If at any time portions of the clothes, such as the seams of wristbands, require rubbing in spots by the hand, the wash-board can be made stationary by the hook and staple, F, and the rubbing can be done as well as in an ordinary tub. The action of the levers is aided by an elastic band, G, which, on the return or up-up-stroke, when less power is exerted, draws the board over. Any kind of wringer can be attached to this machine, and in its general features the inventor is confident of his ability to compete with any in the market.

The invention was patented through the Scientific American Patent Agency, on the 12th of July, 1864, by Wm. M. Doty, of New York city. For further information address him at 19 Beekman street, New York, or E. P. Doty, Janesville, Wis.

THE London *Times* says the costly British ironclads are built on obsolute patterns and are failures.

The Laird Rams.

Since the purchase of these famous ships by the British Government, they have been handed over to the builder to be finished. One of them, *El Tousson*, re-named the *Scorpion*, made a trial trip on the 30th of August. She is thus described by the *Liverpool Courier* :—

"A recapitulation of some of the principal features of her construction will be of interest at the present time. The ordinary hull is of iron of extra strength; over this is a coating of ten inches of teak, and armor plates four and a half inches thick, nearly the whole length of the side, but tapering in thickness, of course, at bow and stern. The bulwarks are novel. The topgallant rail is of wood, and removable at pleasure, the bulwarks proper being of iron, hinged on the deck level, and falling outwardly against the ship's side, thus 'literally clearing for action,' and giving the guns in the turrets an uninterrupted sweep almost any way except directly fore and aft. The muzzle of the guns are only a little above the deck level, and the tops of the cupolas are only five feet high, so that they do not present a very conspicuous mark. But the turrets extend some depth below, and have thus the protection of the ship's sides. What is exposed above deck has five and a half inch plating, doubled near the muzzles of the guns, and fourteen inch teak backing. The turrets are eighteen-sided in the surface presented to shot, Captain Cowper Coles preferring these angles to the curve of a rounded surface.

"There are two turrets, each to carry two twelve-tun guns, ranged side by side, and throwing a 156-pound spherical shot, or a 300-pound bolt, if the weapons are rifled, as most probably they will be. The tower rests on a turn table, running on wheels, the motion being obtained by four crab winches, acting on a toothed rim fixed to the kelson that supports the tower. The tower is prevented from shifting by an immensely strong wrought iron central spindle, bolted into the framework and bed of the vessel. Outside the towers are twenty-four feet in diameter; inside, nineteen feet. The charge and projectile will be handed up to the gun by means of a very simple tackle, these turret guns being positively easier to work than ordinary broadside guns, while the men are all under cover of the armor plating. Aim is taken from the outside of the turret. For this purpose there are three little holes in the roof for the master gunner to pop his head through, there being iron bonnets fitted to glance off rifle bullets. The gunner, in fact, brings the port holes of his turret to bear upon the object. This is not so dangerous an office as would at first appear. Supposing the vessel to open fire at one thousand yards range, a man's head, with the protecting bonnet to shield it, would not be a very conspicuous object, while, in the smoke of a close action, he might take a sight with impunity. One of the turrets was shown in action yesterday, and the facility with which it was worked was admirable, even with an untrained crew.

"The dimensions of the *Scorpion* (and *Wyvern*) are:—Length on water line, 224 feet; beam, 42 feet 6 inches; depth, 20 feet; measurement, about 1,890 tuns. Their great beam gives these vessels wonderful stability as floating batteries. The screw propeller we should state is fourteen feet in diameter, and has three blades, yet the rapidity with which the *Scorpion* answers her helm is remarkable."

THE

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